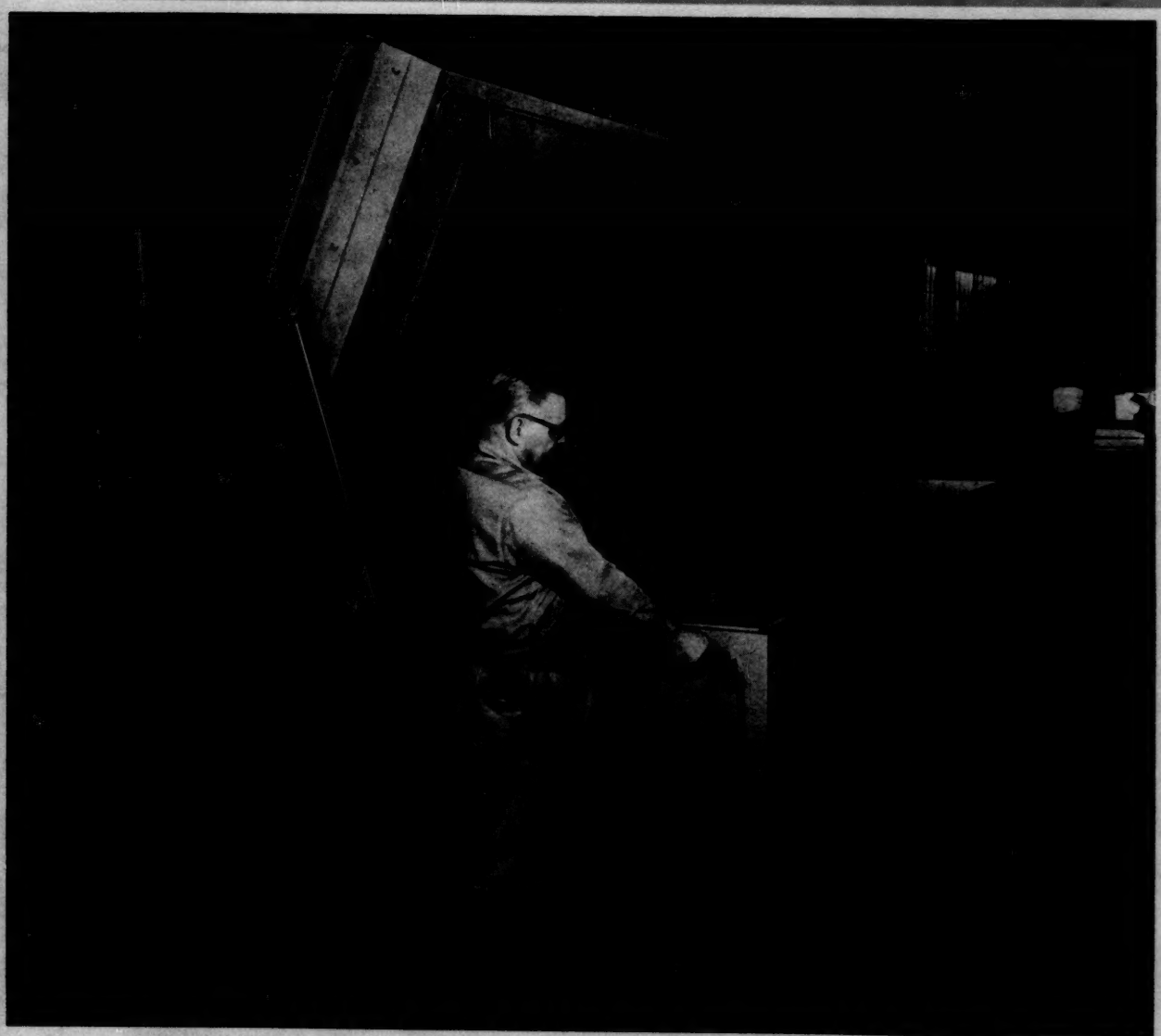
Industrial Refrigeration

JULY
1960

For the men who SPECIFY, BUY and OPERATE Refrigeration and Air Cooling Equipment



COVER — This Freezer Chills 500 Pounds of Metal. See page 28.

KRACK AUTOMATIC DEFROST COOLERS GIVE HIGH-LOW FOODS, CHICAGO

33% more storage

IN SAME SPACE

L. C. Kohlman, Inc., Contractors designed and installed this system

Three rooms to be cooled—each room 105' x 22' x 13' high
For low temperature frozen food room—three Krack No. 36-ED Automatic Electric Defrost Units. 4,760 BTU/hr/1° TD capacity for each unit. Refrigerant: Flooded Ammonia. Type: ceiling.

For two cooler rooms—two Krack No. 5 floor type Industrial Product Coolers. 17,200 BTU/hr/1° TD and 21,300 CFM capacity for each unit.

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Five Krack Coolers were used. Three low temperature electric defrost ceiling coolers maintain −10° F. in the frozen food room; two floor units hold temperature at 36° F. in two dry storage rooms. Krack equipment was chosen by High-Low Foods' management because of dependable past performance. They have been a satisfied user of Krack equipment for 28 years.

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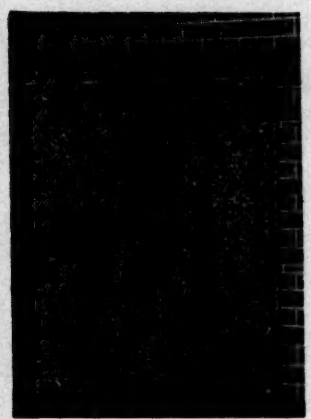
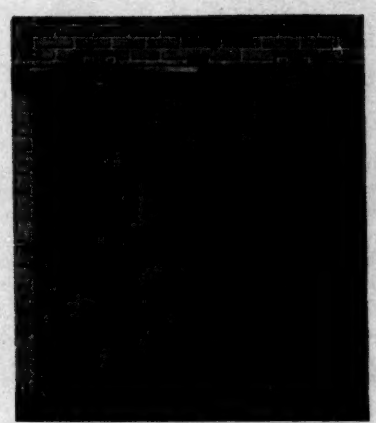


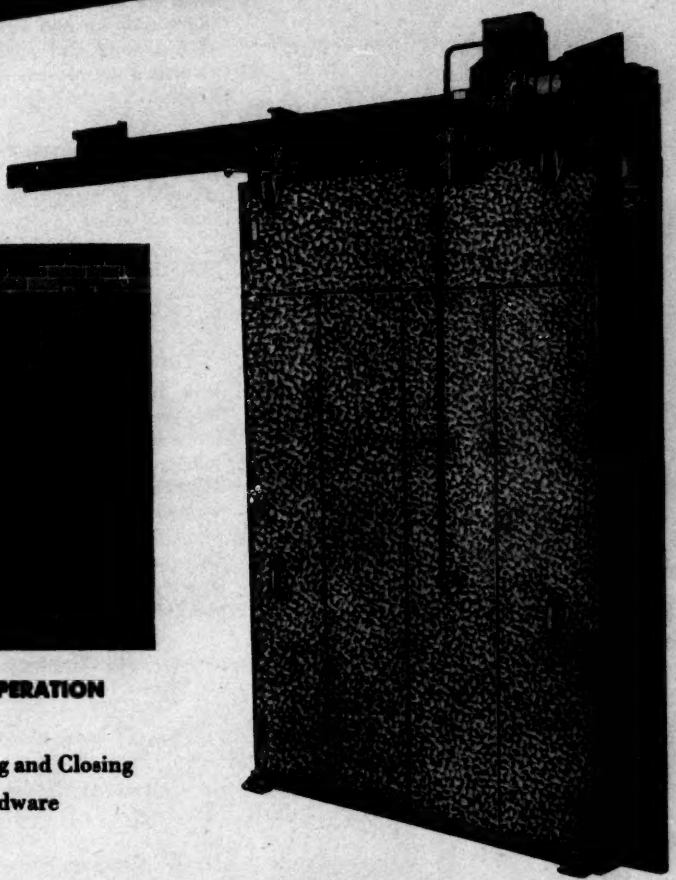
AIR OPERATION

- Safety Entrance and Exit Through Built-In Refrigerator Door
- Speedy Opening and Closing



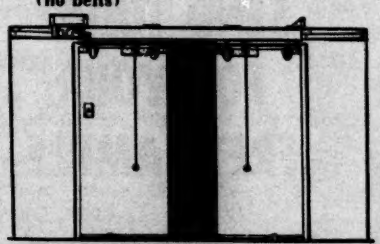
MANUAL OPERATION

- Dependable
- Easy Opening and Closing
- Durable Hardware



"Electro" SAFETY SLIDE

- Structural Simplicity
- Mechanically Sound
- Exclusive Automatic Sealing
- Gear Type Uni-Brake Motor Operation (no belts)



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- Recommended where space factors dictate their use
- Gear Type Uni-Brake Motor Operation (no belts)

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Industrial Refrigeration

July 1960

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- **Food Freezing, Storage and Transport**
- **Processing and Cooling Applications**
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- **Research and Development**

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Insulation Method Cuts Costs of Cold Storage Remodeling

A new insulation method cut labor cost by more than 50 per cent in the recent remodeling of this cold storage area at the Point Adams Packing Co., Newport, Ore. The room was insulated with a free-flowing vermiculite which was poured directly into existing wall cavities and the area above the ceiling. Total cost was figured at 12 cents per square foot.

>>> A NEW method of insulation has cut the remodeling costs of a cold storage warehouse and improved its refrigeration efficiency, according to the construction contractor for a West Coast fish-packing firm.

In remodeling cold storage facilities at the Point Adams Packing Co., Newport, Ore., to maintain a constant warehouse temperature of eight degrees below zero, a new water-repellent vermiculite insulation product was poured directly into existing wall cavities and area above the ceiling.

This is the report of Will H. Knox, project contractor for Lewis Refrigeration Co., Seattle, who was charged with the job of economically improving the efficiency of a warehouse that stores several tons of fresh fish and more than 400 tons of ice.

Knox says that the cold storage area, separated from the rest of the packing facilities by a brick cavity wall, was insulated with the new method at about 50 per cent savings in labor costs. He says that the total, installed, cost of insulation was only 12 cents per square foot.

To fill 3,800 square feet of wall area with the free-flowing insulation, says Knox, it took four men about 16 hours, as compared with an estimated 32 hours for standard insulation methods. A total of 1,200 bags of insulation were used.

Called Water-Repellent Masonry Fill Insulation, the vermiculite product was recently developed and introduced by the Zonolite Company, Chicago. Designed specifically as a fill insulation for cement block or brick cavity walls, the material repels moisture—a major cause of insulation breakdown—and a frequent source of trouble in cold storage applications.

Ray Gildner, manager of Point Adams Packing Co., points out that the insulation of existing facilities is also saving the firm an average of $85 per month in refrigeration power bills. The storage room is refrigerated by a high pressure system with ammonia base. There are three four-cylinder Baker compressors of 15 h.p. and one two-cylinder unit of 25 h.p. Machines are monitored by Standard mercoid low and high pressure controls.

The refrigerant conductors, according to Gildner, consist of direct expansion coils of 1-1/2-inch steel pipe located in the ceiling. There are about 4,800 linear feet arranged in four banks. He points out that pipe coils were chosen over blower systems because rapid air circulation would tend to dehydrate the seafood.

The fish catches, which are primarily tuna, crab, salmon and halibut, are unloaded from the boats and frozen in storage. They are then transported by truck to the headquarters packing plant in Hammond, Ore., for canning and distribution.

Gildner reports that the firm plans to make similar remodeling of cold storage areas at the Hammond plant and another at Depot Bay, Ore., using the identical method of insulation.

New Unitary Certification Directory Issued

>>> A SECOND-QUARTER Directory of Certified Unitary Air-Conditioners is now being distributed by the Air-Conditioning and Refrigeration Institute as a part of its Unitary Air-Conditioner Certification Program.

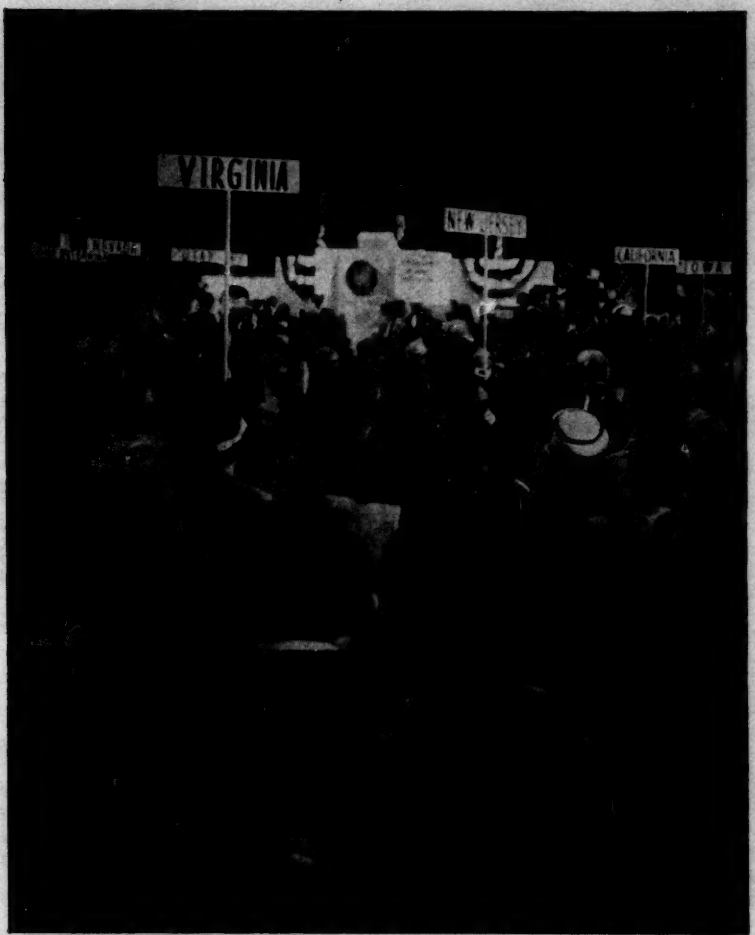
The new directory lists some 2,150 unitary models of 48 manufacturers who have signed contracts to participate in the program, and is being distributed, as were its predecessors, to dealers and contractors throughout the country, to architects and consulting engineers, and to government personnel concerned with air-conditioning. It also is available to the public through the dealer and contractor outlets of the participating manufacturer, who represent more than 90 per cent of total U. S. production of unitary air-conditioning equipment. It may be obtained from Better Business Bureaus throughout the country, as well as through ARI headquarters in Washington.

While the program at this time covers only unitary air-conditioners up to 135,000 Btu per hour capacity, it is expected that heat pumps within the same range may be included in it sometime this year or early in 1961, according to ARI officials who added:

"This program is designed to provide enforcement authority to the applicable ARI Standards. We feel that it is an aid to contractors, distributors, architects, dealers, and all purchasers of unitary air-conditioning. It gives them the assurance that the equipment they are specifying or buying will meet the requirements it claims to meet. We believe that this program offers proof of our industry's 'coming of age', and we believe that it will eliminate unrealistic claims upon which the purchaser has, at times in the past, been unable to make necessary comparisons."

Indicative of the success of the program is the fact that the U. S. Air Force has directed that any unitary-air-conditioners purchased for use by the Air Force must bear the seal of certification of ARI.

In convention halls, coffee shops and commuter trains...



Heated discussion is still a convention trademark, but physical swelter has given way to air-conditioned comfort in giant convention halls. The amount of air-conditioned space needed for meetings and exhibits often has a bearing on the location chosen for major conventions.

Quick snacks and coffee breaks are bread and butter to the modern air-conditioned "coffee shop"—a relatively new and thriving institution in busy urban centers.

Brow-mopping days are over for many train travellers, thanks to air-conditioning. Air-conditioned cars pay off in increased traffic—and immeasurable good will.

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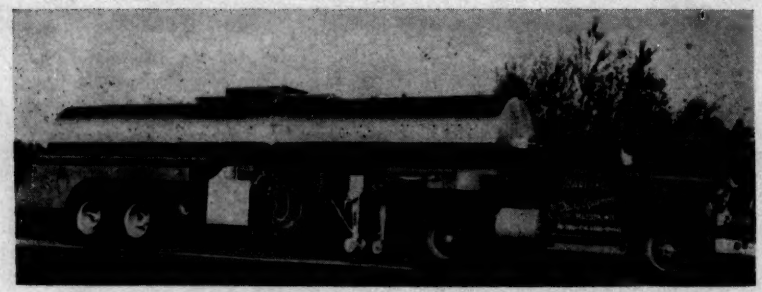


Pictured is the newly designed all-stainless steel trailer tank truck. This tank will be used for hauling milk, fruit juices and liquid chemicals. A new basket construction connects the front head section with the rear head section for great stability.

New Design In Tank Trucks For Milk and Fruit Juices

»» A NEWLY designed all-stainless steel trailer tank truck for hauling liquids recently made its appearance in the mid-west and is the fore-runner of others to follow. The new design consists of a round tank with a new basket-type construction.

The basket construction connects the front head section to the rear head section, and with intermediate sections along the tank. The designing engineers report that the surge of the liquid is then more quickly and more uniformly distributed throughout the tanks.

The Dairy Equipment Company of Madison, Wisconsin, had the new transports made by their subsidiary company, Krueger Fabricating Company, Inc. Stainless steel was supplied by Allegheny Ludlum Steel Corporation in the making of the Kari-Kool design.

In addition to the round design, Kari-Kool engineers use more, but smaller, structural rings in the interior of the Kari-Kool tank design. In other type tank designs, large structural rings are used that encircle the tank and penetrate both the inner tank and outer jacket. The Kari-Kool doesn't do this.

With the basket-type construction, and the round design of the tank as opposed to the previously used elliptical shape, Kari-Kool engineers believe that better balance and ease of handling are made possible with a lower center of gravity.

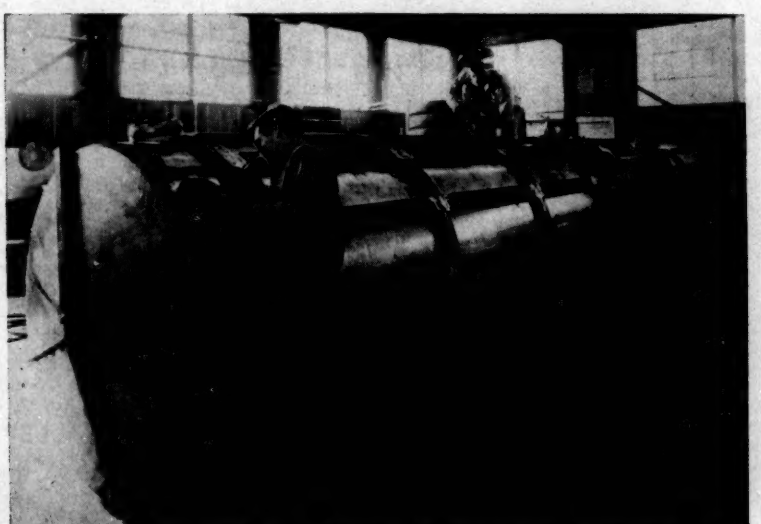
The pictured tank is 35-feet long and has a 4200 gallon capacity. The inner tank is made of 10 gauge Type 316 stainless steel, and has two-inches of glass insulation. This tank is reinforced with five-inch and four-inch reinforcing channels.

The outer jacket is made of 18 gauge Type 302 stainless steel, polished to a satin finish.

Maintenance of the tank, both interior and exterior is practically negligible. The tank is designed so that it can be cleaned either manually or with automatic spray equipment.

Varnish, chemicals, pharmaceuticals, resins, liquid plactic, inks, molasses, almost all types of acids, milk and orange juice can be easily carried in the new tanks.

One of the transportation companies plans to use the new tanks for the shipping of milk from Wisconsin to Florida, and return with orange juice, keeping the tank in payloads going both north and south.



This is the new basket construction which connects the front head section with the rear head section for greater rigidity. Krueger Fabricating Company, Inc., a subsidiary of The Dairy Equipment Company of Madison, Wisconsin, is making the new tank truck.

New Date For Fleet Maintenance Exposition

»» TO CLEAR the calendar for participation by all suppliers to the nation's 30,000 operators who maintain their own truck and bus fleets, the Private Truck Council of America, Inc., has set new dates for the First Fleet Maintenance Exposition.

Originally scheduled for October, the Exposition will be held December 5 to 8, 1960 in New York City's Coliseum. The new dates avoid any possibility of conflict with other motor industry events.

The Fleet Maintenance Exposition is not only the first but is also the only event to concentrate program and exhibit area on the specific problems of fleet owners who maintain the vehicles that they operate.

A survey of fleet owners conducted during the planning stages of the Exposition assured attendance by fleet owners and their key personnel. Early reservations for exhibit space by top manufacturers of fleet products demonstrated exhibitor interest, the sponsor reports.

Complications developed, however, when some manufacturers of fleet maintenance products found that existing booths and top sales and technical personnel had been committed to another event scheduled in Chicago at the same time.

The new dates, which sponsors of the Fleet Maintenance Exposition have arranged with officials of the New York Coliseum, clear the way

for manufacturers to use existing booths and the same personnel in both shows.

The program of the Fleet Maintenance Exposition will feature a combination of workshop sessions, panel discussions and problem clinics based on a survey of interests expressed by fleet owners in the seven-state area around New York City.

Subjects to be covered include: shop maintenance techniques, operating records and accounting procedures, shop equipment, new vehicle types, selection of mechanics, safety regulations and requirements, deferred maintenance, coolants, lubricants, fuels, interchange problems, time standards, tires.

Approximately 150 industrial exhibits, entered by leading manufacturers who supply fleet owners with maintenance materials, parts, equipment and services will be coordinated with the subjects covered in the meetings. More than 12,000 fleet operating firms, all with ten or more vehicles and all with their own maintenance departments, have indicated that company officials and maintenance supervisors will attend the sessions and exhibits.

Cooling Towers Without Treatment Brings Damage

>>> THE rapid corrosion damage to which air conditioning systems are subject in urban areas where the atmosphere is heavily contaminated by sulfur dioxide is dramatically demonstrated in a case history of a 1,720-ton cooling installation in a well-known New York City office building.

The structure is the 35-story McGraw-Hill Building, at 330 West Forty-Second Street, where leaks at several points in the cooling tower piping gave the first clue to damage only eighteen months after the system went into operation.

The building is cooled by packaged air conditioning units using cooling water, circulating through fourteen separate cooling tower systems, involving eighteen towers in six different locations on the huge structure's various setbacks. This complex arrangement had been selected over a single larger tower for esthetic reasons, since the smaller units, strategically placed, could be utilized without altering the building's silhouette. Some of the cooling towers are of the forced draft type and the others are induced draft units.

The corrosion damage was first suspected to be caused by electrolysis from stray direct currents picked up by the piping system. At that point, Water Service Laboratories, Inc., chemical engineers and corrosion prevention specialists, were called in to make a thorough inspection.

An analysis of the cooling waters showed a severe acidic condition, with pH's as low as 4.0 in some of the systems. While no evidence of electrolytic damage was found, a serious slime problem was noted, along with foaming, in all of the induced draft towers. Corrosion was well advanced in all the cooling towers of both types, which was attributed to the SO_2 concentration in the circulating water, picked up as it sprays through the atmosphere.

A thorough cleaning and chemical water treatment program was instituted which carried the system through the 1959 cooling season without further incident.

The whole installation was first cleaned completely. A slime dosage program was instituted, consisting of regular inspections and application of a hypochlorite chemical, as required. The cleaning problem has been aggravated by the use of packaged air conditioning units with their non-removable refrigerant condenser heads. Backwash connections were suggested and installed so that the equipment could be flushed out periodically.

Chemical treatment of the circulating water was undertaken by Water Service Laboratories, using their patented internal chemistat, a proportional feeding device that was placed directly in the pans of the induced draft cooling towers. The forced draft units required a special piping arrangement to use the device, which feeds a chromate treatment into the system in proportion to the rate of flow. Water technicians collect and analyze water samples at frequent regular intervals during the season as a check on the accuracy of the corrosion control.

Hy Jarvis Named 12th Exposition Chairman For 1962 ARI Show

>>> H. T. "Hy" Jarvis, president of Recold Corporation, Los Angeles, has been named chairman of the 12th Exposition Committee of the Air-Conditioning and Refrigeration Institute, it is announced by the Board of Directors of ARI.

The Exposition will be held February 12-15, 1962, at the Great Western Exhibit Center in Los Angeles, the first time that an ARI show has been staged on the West Coast.

Other members of the Committee for the 12th Exposition of the industry are: W. A. Siegfried, president of Superior Valve & Fittings Company, Pittsburgh, vice-chairman; Sydney Anderson, Jr., manager, Los Angeles branch, Airtemp Division of the Chrysler Corporation; B. E. James, president, McQuay, Incorporated, Minneapolis; J. A. Mulcahey, vice president of sales, Dunham-Bush, Inc., West Hartford, Connecticut; George A. Schnier, national sales manager, Refrigeration Department, American Potash & Chemical Company, and George Mills, ARI show director.

H. F. Spoehrer, vice president and treasurer of Sporlan Valve Company and chairman of ARI's Show Policy Committee, and Rudy Berg, president of ARI and vice president of Copeland Refrigeration Corporation, are ex officio members of the show committee, also.

The committee held its first meeting late in April in Los Angeles to lay initial plans for the show, and is expected to hold another meeting this summer. Meanwhile, Show Director Mills has been authorized to begin promotion of the exposition, now definitely scheduled at the Los Angeles site, and to start making the multiplicity of arrangements essential to a successful exposition.

While a specific "theme" for the show has not been finally settled, it will stress the mushrooming importance of the West Coast market for all manner of refrigeration and air-conditioning equipment—residential, commercial, industrial, defense-wise, and health-wise.

In this connection, George Mills has pointed out that the Far West is, according to all available statistics, the most rapidly developing market in the nation for the industry's products, and added that the ARI 12th Exposition will be the first really national show of air-conditioning, heating, and refrigeration equipment ever held west of the Mississippi.

"We on the Pacific Coast will indeed welcome the ARI show to our area, and we are sure that the increasing magnitude of the Far West as a market will attract the most complete group of air-conditioning, heating and refrigeration exhibits ever placed under one roof," Mr. Jarvis said. "As chairman of the committee, I will work toward this goal, and I am sure that other members of the committee, several of whom have been active on previous show committees of ARI, will contribute greatly of their time and experience to achieve it."

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For your protection, *every* cylinder and tank truck of Armour Ammonia is subjected to a rigid qualitative test after filling—to make sure it is *at least 99.98% pure when delivered* to you. This extra Armour test eliminates the danger of your receiving ammonia that has been contaminated during the filling process.

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news briefs of the month

"Teflon" Approved by Food and Drug Administration

The use of "Teflon" resins in food handling service has been accepted by the food and drug administration according to Robert A. Kellar, Marketing Manager for "Teflon" in the Du Pont Polychemicals Department. The FDA ruling paves the way for dozens of new applications for "Teflon". An important area into which it is expected to expand is food processing. One member of the resin family had already been accepted by FDS for use in milk handling equipment. The latest action of the federal agency gives virtual across-the-board clearance to "Teflon" resins.

Trailer Makers Schedule Container Discussion

The 12th Annual Summer Meeting of the Truck Trailer Manufacturers Association at The Homestead, Hot Springs, Virginia, July 10-13, will feature a thorough discussion on containers (demountable trailer van bodies), according to TTMA President C. W. Alexander. The Wednesday morning July 13 general session, with presiding officer Fred S. Neumann, Chairman of TTMA's Container Conference, will feature panelists Keith W. Tantlinger, Vice President—engineering of the Fruehauf Trailer Company; Eugene Ryan, President, Rail Trailer Company; S. A. LaMar, Project Director, Douglas Aircraft Company; Hugh Foster, Pullman Standard Car Company and Nelson K. Rogers, Sea Land Service, Inc.

Air Conditioning is "Ounce of Prevention"

One hundred tons of air conditioning capacity will become the proverbial "ounce of prevention" when a leading manufacturer of electronic components broadens its line of products. Sarkes-Tarzian, Inc., Bloomington, Ind. has ordered the equipment to head off possible production problems caused by changes in temperature and humidity when it begins making FM receivers and magnetic recording tapes. A spokesman for the company says the air conditioning equipment, which includes a Carrier absorption refrigerating machine, low velocity air handling apparatus and a cooling tower, will maintain a temperature of 80 degrees and a relative humidity of 45 per cent throughout the plant. These conditions are needed to stabilize processing and attract and hold good workers, he said.

South Carolina To Get New Cold Storage Plant

A new cold storage plant is in the making for the South Carolina State Ports Authority. It is needed to meet the increasing requirements for refrigerated warehousing space. Authorization for the project has been approved and the authority's engineering department is preparing for the unit to be built at the North Charleston Terminal. Bids for the construction are expected to be invited soon. The unit will be used for warehousing, frozen foods and other products needing cold storage space, while being exported or imported through the port.

Press Rooms Need Air Conditioning

A. Hoen & Co., Inc. lithographing and printing firm in Baltimore, Maryland is installing air conditioning and humidity control equipment in their recently enlarged press room. The air conditioning becomes necessary, they have found, because a humidity increase from 55 to 80 per cent results in as much as a quarter inch variation in dimensions of 76 in. paper stock. Air conditioning will permit feeding uniform stock to the presses.

Modern Village Square is Air Conditioned

The Charlottstown Mall in Charlotte, N C. has constructed a "second village square". It is a fully enclosed and fully air conditioned shopping center outside of Charlotte. Attractions in the square include tropical gardens, a pool containing rare fish, three large bird cages, park benches and gas street lamps once used in Philadelphia more than 100 years ago. Weather in the square is controlled by a water chiller that uses steam to produce cooling. The development includes 40 stores, a cafeteria and a 300 seat auditorium.

Mechanized Scheduling Of

By Captain HENRY G. SNIDER
Civil Engineering Center, Institute of Technology

Here is a system of scheduling preventive maintenance work which is now used by the Air Force but is equally applicable to the industrial operation with a large number of machines of all types to maintain. It is particularly useful in scheduling periodic inspection of refrigeration and air conditioning units scattered over wide areas.

»» AN effective preventive maintenance program requires skilled personnel, proper tools, comprehensive scheduling and accurate recording. This scheduling and recording is a routine administrative task that should be handled by clerical personnel. One of the most efficient clerks available today for sorting, selecting, filing and recording is an electric punch card machine. The system presented here is designed to make maximum use of these machines for scheduling and recording. When used it will help provide an effective and efficient preventive maintenance program.

The Mechanized System for scheduling maintenance is not a "method of performing maintenance work". It is not a panacea, nor will it even replace the skilled technician, his refrigerant bottle, screw driver, pair of pliers and wrenches. That is not the purpose of the system.

This For Management

It is a management tool, designed to assist those persons responsible for the maintenance work by automatically establishing a constant work schedule in accordance with good maintenance practice, and maintaining the results as a matter of record.

The manual method of scheduling and recording maintenance in use today is inadequate; it is a hit-or-miss proposition. A great deal of time and effort is required to perform the task properly. In many instances, a memory method of scheduling and recording is used. This breaks down completely when there is a change of personnel.

In most instances the most skilled maintenance man is being used as a scheduler and recorder. This is a misappropriation of skill and time. We continually hear the statement, "The right tool for the right job". This also applies to use of personnel. Skills must be used properly if an organization is to function properly.

The mechanized scheduling system using electric punch card equipment will allow the release of the skilled technician from his pencil-pushing job to perform work for which he is trained. It will also allow him to work on a predetermined schedule free of the "panic jobs" that disrupt the curve of man-hours versus available time. The system provides for a constant work load with respect to time. In addition, the results of the maintenance man's efforts and his detailed findings are recorded for future use automatically.

The prime objective of any preventive maintenance program is to provide a constant state of maintenance assuring a responsive service to the needs of the "customer". This name "customer" may apply to the Base Commander, the Squadron Adjutant, or the red-haired secretary down the hall. Any maintenance section deals in "service". True, there is little glamour in service, but it is a vital part of each organization if that organization is to function properly. The mechanized scheduling system is designed to assist in the accomplishment of this maintenance mission. To achieve this the system incorporates five major features—1. proper scheduling; 2. maximum maintenance output; 3. high quality of maintenance; 4. maintenance of an inventory; 5. analysis of maintenance records. Each of these factors are necessary for the system to be effective.

In establishing a schedule such areas as equipment type, age, use factors, physical location and configuration must be considered. The schedule is determined by the maintenance requirement and each of the above areas influence this requirement. There is a different requirement for window air conditioners, package units, direct expansion systems, water chillers and absorption units. Maintenance requirements for an item of equipment are directly proportional to its age; the older the unit the greater the maintenance requirement. A unit operating twenty-four (24) hours per day, three hundred and sixty days per year requires more maintenance than an eight-hour day, three-month operational unit. Such factors as contamination of the air handled, type of filters, length of ducts, etc., govern the extent of maintenance required. In establishing a schedule, each item is studied individually and the above factors considered in determining a frequency and a time of maintenance. The system does not use a blanket frequency for all units but has a great deal of flexibility which assures the proper scheduling of all maintenance.

By reducing the administrative work load on the maintenance section a maximum maintenance force can be mustered. The system, in eliminating the full time pencil-pushing positions by use of electric punch card equipment, allows the use of nearly all of the assigned personnel for performance of maintenance work. A skilled technician can apply his knowledge; he will be working with the tools of his trade rather than with a pencil. As a result, the quantity of maintenance work will increase.

The quality of maintenance is an-

other feature incorporated in the system. Maintenance is performed in accordance with a current check list generated by experience, good maintenance practice and manufacturers' recommendations. Expended man-hours must not only yield a quantity but also a quality of maintenance. Guidelines are established by a correct check list, and conscientious adherence to this list by the maintenance man provides this necessary quality.

Inventory a By-Product

A current inventory of equipment requiring maintenance is an excellent aid to those responsible for maintenance. True, providing this inventory is not part of the mission of the maintenance section. This list is available as a by-product or bonus from the system.

The maintenance supervisor will find that he is much better equipped to discuss maintenance requirements, manpower shortages, equipment replacements, and similar problems with his supervisors when he has such an inventory list available.

The information fed back to the system by the maintenance man is recorded and stored for future use. Such things as expended man-hours, major maintenance performed, equipment outages, and other data can be used to establish frequency changes, equipment replacement, labor standards and other programs. The necessary information is available for a complete economic analysis of the maintenance picture. As yet this area is relatively unexplored. The potential is there; time and research will tap this source of information.

In establishing a mechanized scheduling system there are three distinct steps—1. Data conversion; 2. Key punch; 3. Trouble shooting.

Data conversion is a process in which the available information pertaining to a piece of equipment or property is transferred from existing records to an interim form which will be used to produce the master record. These pieces of information are carefully selected so when assembled they will tell a complete story.

These pieces of data must be converted from their native form to a language which will be acceptable to the electric punch card machine. Two examples of this translation are shown in Figs. 1 and 2.

Using these and other guidelines, the information contained on the existing maintenance records is converted and entered on a Data Transfer Form. This form should be simple and easy to read. Most machine record sections have a standard form which may be used for this purpose.

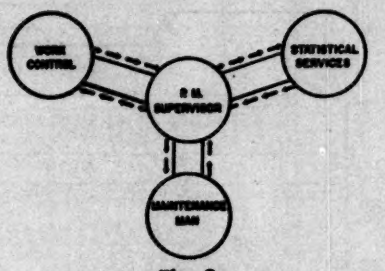


Fig. 3

The EAM equipment is not capable of detecting an error in the information that is submitted. The output of the system will only be as good as the input. Therefore, it is extremely important that the original information be correct and that the conversion be accurate.

The next phase in the establishment of the system is the key punch operation. This is a function of the machine records section. The information presented to the machine operator will be punched into the record card. The system uses an adapted format of a standard IBM card. This is called the Master Card. See Fig. 5.

Upon completion of the punch operation, the Master Card Deck will be processed by machine and the punched information interpret-

CODE
18 02 02 010

18 - Refrigeration, Air Conditioning, Evaporative Cooling and Mechanical Ventilation Equipment

02 - Air Conditioning Unit

02 - Package Air Conditioner

010 - 10 Ton Capacity

Fig. 1

CODE — The code number is a nine digit numerical designation describing the item being considered. The first two digits refer to the major field or area to which the item belongs. Digits three and four indicate the sub-code as sub-classification of the item within the major field code. The fifth and sixth digits establish the secondary classification of the item. Digits seven through nine indicate the capacity, size, or unit of measurement of the item.

FREQUENCY
44 18 2 0

44 - Annual Inspection due on 44th week of year

18 - Semi-annual Inspection due on 18th week of year

2 - Monthly Inspection due on 2nd, 6th, 10th, etc. week of year

0 - Weekly Inspections not required

Fig. 2

FREQUENCY — The frequency number is a six digit numeric indicator of the intervals or frequency of required service on a specific item. The numbering is based on a fifty-two week calendar starting each year. The number consists of four (4) separate functioning designations. Digits one and two indicate the week of annual inspection, digit three and four indicate the week of semi-annual inspection, digit five indicates the week of monthly inspection, and digit six determines the requirement for weekly inspection.

P.M. SCHEDULING CHANGE NOTICE

ADD: ☒ DELETE: ☐ CHANGE: ☐ EFF. DATE: 1 June 57

OLD		NEW	
CODE	ITEM	CODE: 18020 2010	ITEM: 0049
TYPE	ZONE	TYPE: R	ZONE: 04
FACILITY	LOCATION	FACILITY: T0288	LOCATION: P207K
FREQUENCY	NOUN	FREQUENCY: 44 1820	NOUN: PACKAGE A/C
REFERENCE	INST. DATE	REFERENCE: 85-18	INST. DATE: 0557
SOURCE	LABOR STD.	SOURCE: 093232	LABOR STD.: 04 01 01.00

IBM 6134

Fig. 4

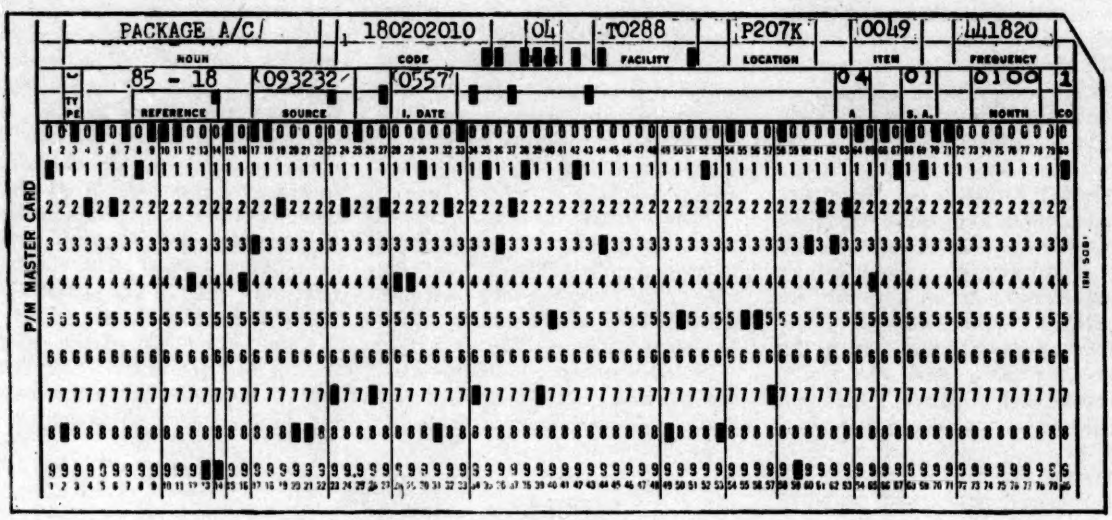


Fig. 5

ed and printed at the top of the card on the two lines provided. This deck of Master Cards is now the Master Record on all equipment or facilities requiring maintenance.

It contains the complete picture on each line item and is the source data for all subsequent operations of the system.

Prior to setting the scheduling system in motion, it is recommended that a "trouble shooting" operation be performed. The complete Master Card Deck should be sorted into a sequence of code and a machine-listing be prepared by Statistical Services Section on an accounting machine. This list should be checked in the field to assure that the information contained in the Master Card Deck is complete and accurate. Upon completion of the trouble shooting procedure, the system may be placed in operation.

Four separate sections are involved in the scheduling, performing, and recording of maintenance work—1. Statistical Services; 2. Preventive Maintenance Supervisor; 3. Preventive Maintenance Crews; 4. Work Control and Maintenance Shops. The prime consideration here is preventive maintenance. To establish distinct lines of responsibilities, a flow chart depicting the channels of communication was prepared. See Fig. 3.

These flow channels assume a control of all scheduled, major maintenance and preventive maintenance work. The preventive maintenance supervisor is responsible for performance of preventive maintenance and must have control over those organizations contributing to the programs.

Now for the purpose of explanation of the system and its operation, let us turn the clock back until the month of May 1957. As a result of a work order, a ten ton package air conditioner was installed in Building 288 at Post 207-K. Building 288 is located in Zone 4 of the base and from an inventory of existing package air condi-

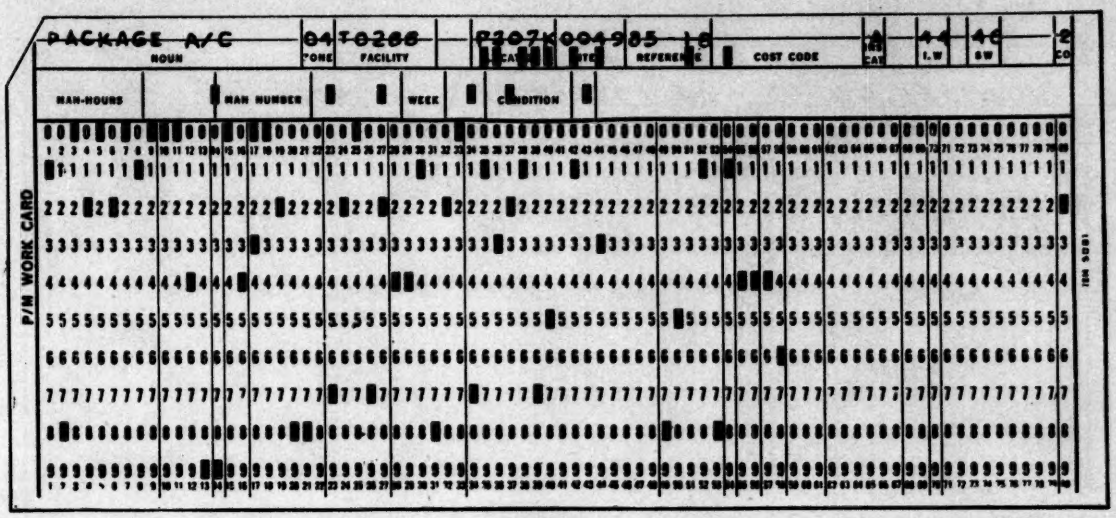


Fig. 6

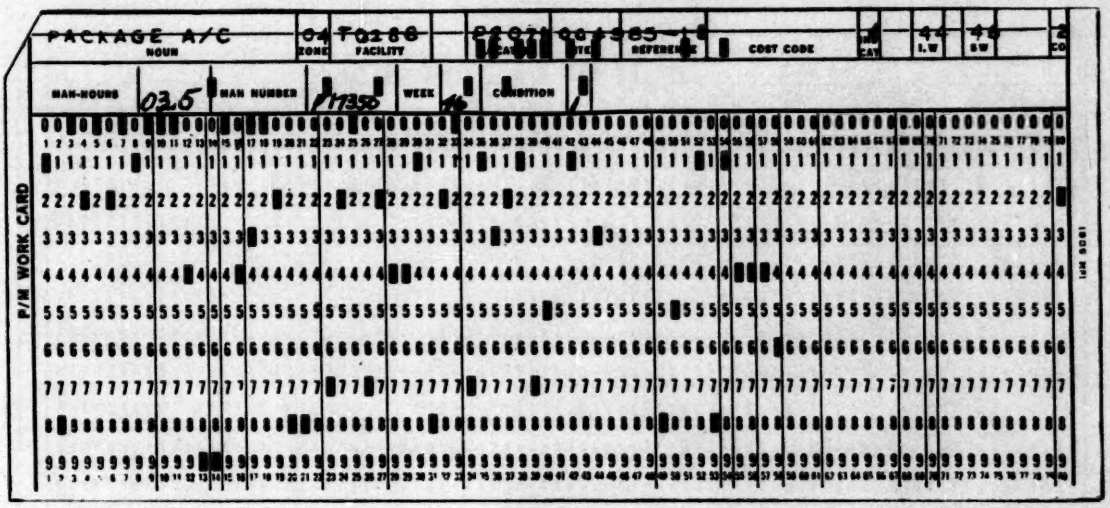


Fig. 7

tioners, it is determined that this is the 49th package air conditioning unit on the base. Research of AFM 85-18 has shown that an annual, semi-annual and monthly frequency of inspection is recommended.

Use, location and existing work load establishes that the best time for performance of the annual service requirements is the 44th week of the year; the semi-annual service will then be performed on the 18th week and monthly service on the 2nd, 6th, 10th, etc. week. Engineering labor standards indicate a 4 hour annual, 1 hour semi-annual and 1 hour monthly requirement.

This mass of information is recorded on the Preventive Maintenance Scheduling Change Notice Card Fig. 4, by the preventive maintenance supervisor or his representative.

The card is submitted to Statistical Services where the indicated information is punched on the Master Card, Fig. 5, and all punched information interpreted in two lines at the top of the card.

All information defining and designating the new piece of equipment is contained in the Master Card. The card is now filed in the Master Card Deck until the weekly scheduling operations is performed.

Statistical Services Section is responsible for providing scheduling service to the preventive maintenance supervisor and for the maintenance of all files. The initial step is the sorting of the Master Card Deck to determine the annual, semi-annual and monthly preventive maintenance requirement. This is done on a weekly basis.

Let us assume that Statistical Services is now preparing the work schedule for the 44th week of the year. The Master Deck is sorted and processed and package air conditioner 49 is one of those selected for annual inspection.

The work schedule is now established for the 44th week. This information must be transmitted through the preventive maintenance supervisor to the maintenance men. Another adapted card format is used. This is called the Work Card.

NOUN	ZONE	FACILITY	LOCATION	ITEM NO.	I. CAT.	I. WK.	S. WK.
PACKAGE A/C	04	T0288	P207K	0049	A	44	46

REASON FOR DELINQUENCY Man hours were diverted to complete Annual Service on System A/C 0152 Insufficient time to accomplish service on Package A/C 0049

EST. DATE OF COMPLETION: 47WK DATE: 5 NOV 59 SIGNED: Richard Poe

Fig. 8

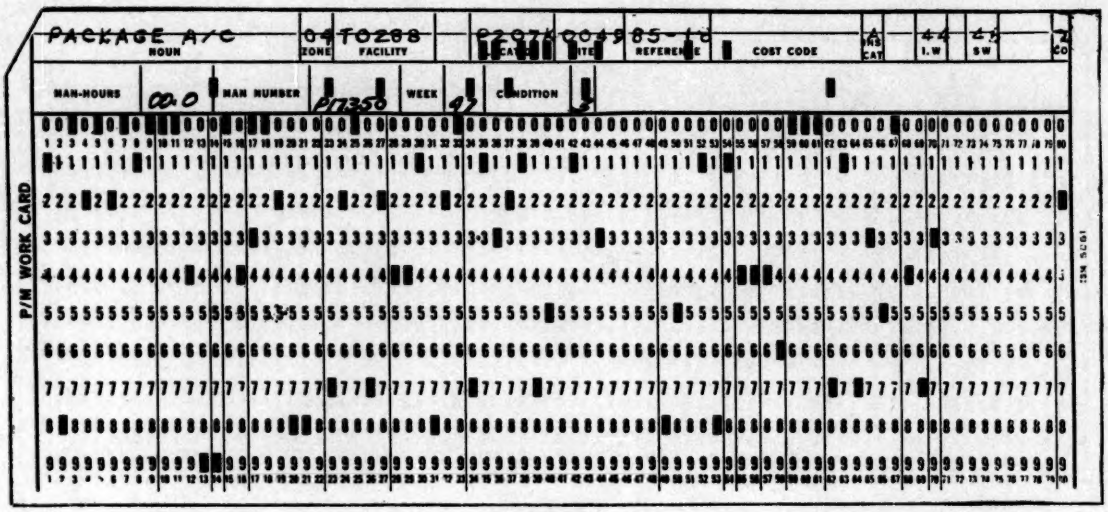


Fig. 9

The selected Master Card is reproduced as a Work Card Fig. 6. Only that information required by the worker is transferred. In addition, the category of inspection (annual, semi-annual or monthly) and the issue and suspense weeks are indicated on the Work Card. In addition, the Work Card deck is duplicated on obsolete cards and held in suspense in Statistical Services.

The deck of Work Cards are sorted into a predetermined sequence and forwarded by Statistical Services to the preventive maintenance supervisor so as to arrive prior to the start of the schedule week. The PM Supervisor then forwards the Work Cards to the proper work crew or center.

These cards direct the schedule of the PM crew, giving them the name of the item, its location, type and category of inspection, reference check list, issue week and suspense week. The Work Card also provides space for feedback information—man-hours expended, man identification number, completion week and equipment condition. Five condition codes are used to establish the status of the equipment at the time of the inspection.

Condition 1—completed work, no difficulties

Condition 2—completed work, additional work by shop organization required

Condition 3—work not completed due to shortages of manpower and other reasons

Condition 4—work completed, unit on seasonal shutdown

Condition 5—work completed, previous Condition 2 not satisfied

The workman, upon completion of the directed work, fills in the required information with the appropriate condition code as in Fig. 7.

The completed Work Card is returned through the PM Supervisor to Statistical Services where the feed back information is

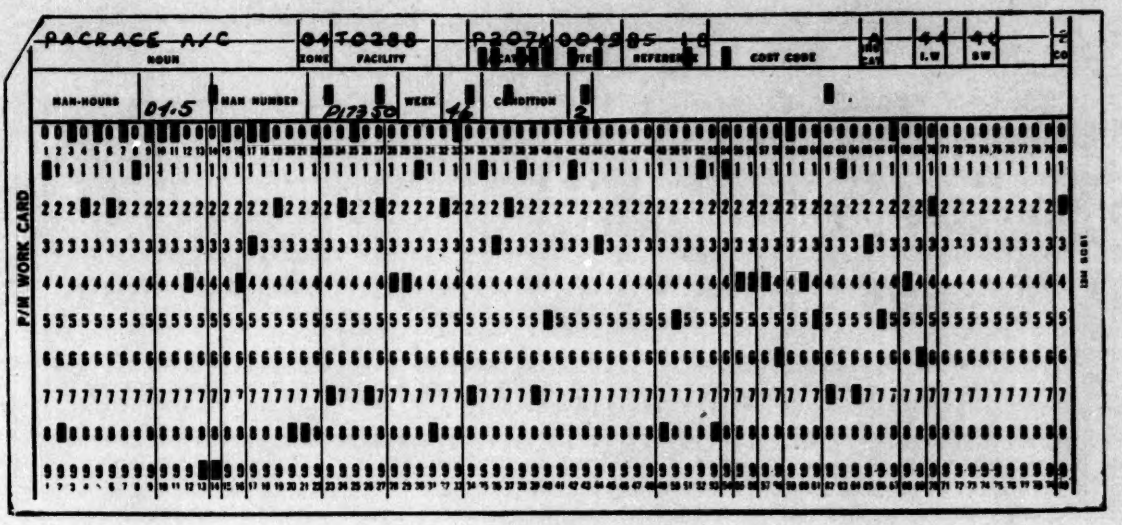


Fig. 10

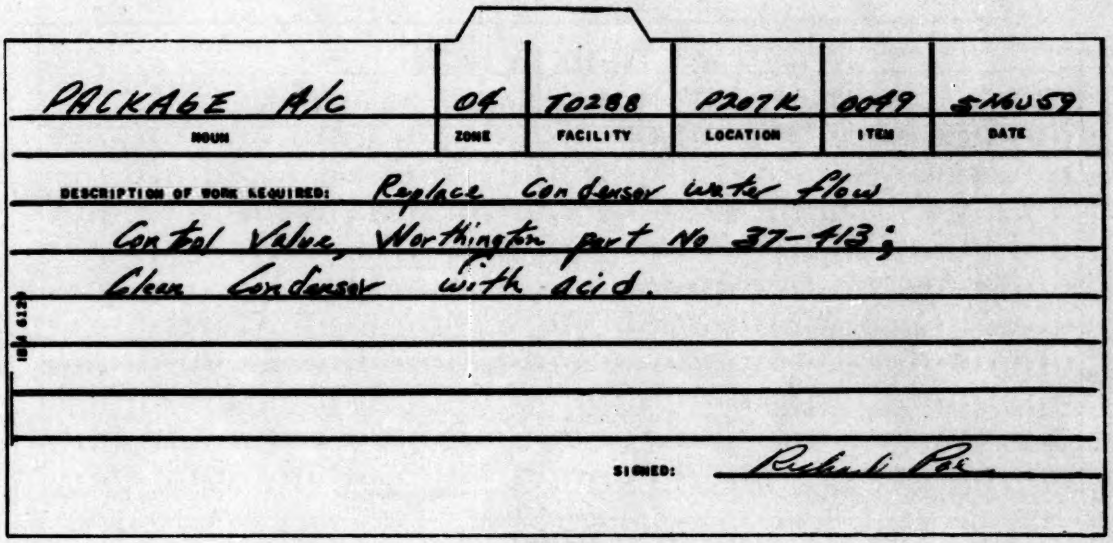


Fig. 11

punched into the card for future reference.

In the event the worker is unable to complete the required service within the allocated time he is provided a means of requesting one weeks "grace". He makes this request on a Delinquency Card Fig. 8.

These Delinquency Cards are retained by the PM Supervisor and are used in balancing the weekly delinquency list furnished by Statistical Services. This list is compiled from the Work Card Suspense Check Deck retained by Statistical Services.

In the event the required service cannot be completed within the standard and "grace" time allocation, the Work Card must be returned to Statistical Services as a Condition 3. The feed-back information is punched into the Work Card as in Fig. 9.

If as a result of a directed inspection and service, the maintenance man finds a deficiency requiring work beyond his capability, he must request a work order. He accomplishes this by entering a Condition 2 on the Work Card as in Fig. 10.

He also completes a Work Order Flag Card Fig. 11, giving the description of the work needed. He forwards the Flag Card with its respective Condition 2 Work Card to the Preventive Maintenance Supervisor.

The PM Supervisor will pull all Flag Cards and hold them in suspense awaiting the appropriate Work Order Request Fig. 12. All Delinquency Cards are held and checked against the Work Card Delinquency List furnished by Statistical Services. This is a control measure to detect loss of cards or incomplete action within the system.

Statistical Services will process the Condition 2 Work Cards and punch in the information feed back by the workman in the appropriate card column as previously stated.

The same procedure applies for

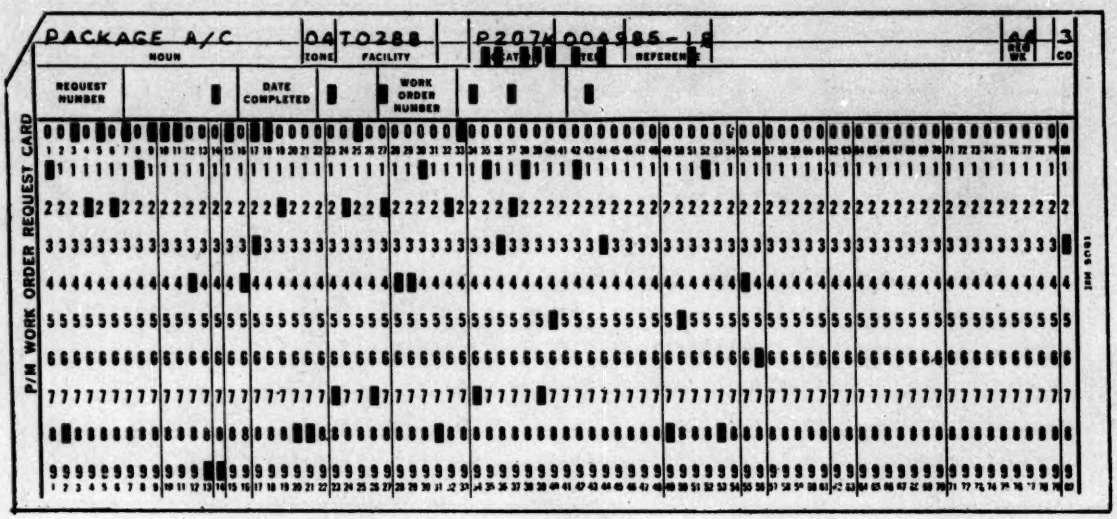


Fig. 12

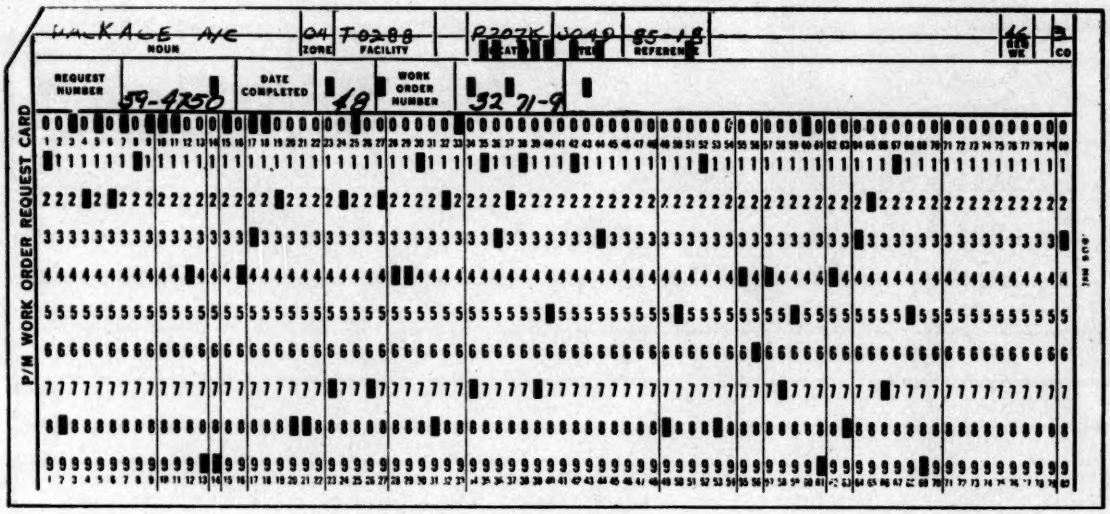


Fig. 13

those cards marked Condition 4 or 5 by the worker. Each is punched to include the feed back information and then processed against the Work Card Suspense Deck. Each matched suspense card is destroyed and those unmatched cards which are delinquent are used in preparing the Weekly Delinquency List.

The completed Work Cards will then be processed by Statistical Services to select those cards marked Condition 2. The Condition 2 Work Cards are those requesting Work Orders. Those marked Condition 1, 3, 4 and 5 are filed in the Work Card File. By means of machine, these Condition 2 cards are reproduced as Work Order Request Cards, Fig. 12.

The Condition 2 Work Cards are placed in a Work Order Request Suspense File with cards justifying other outstanding Work Order Requests. The Work Order Request Cards are forwarded to the Preventive Maintenance Supervisor.

At the same time, the Work Card Suspense Check Deck is processed and those cards which are overdue are selected. These overdue Work Cards are reproduced as a machine list and then returned to file. The machine list indicating the outstanding Work Cards is forwarded to the PM Supervisor for use in checking Delinquency Cards.

The PM Supervisor will "mate" each Work Order Request Card with its respective Flag Card and forward the pair to the Work Control Section.

The Work Control Section will prepare a shop work order on the basis of the Work Order Request Flag Card. The shop work order is forwarded to the shops for accomplishment. Such information as Request Number, Work Order number and date completed are entered on the card Fig. 13, by Work Control and the card returned to Statistical Services through the PM Supervisor.

The information indicated on the completed Work Order Request Card is punched into the card by Statistical Services. The card is

then checked against the condition 2 Work Cards in suspense and the matched pair filed in the Work Card file in a pre-selected sequence along with all other completed Work Cards.

The entire cycle of scheduling, maintaining, recording and filing is completed. Each section has a specific responsibility which must be fulfilled for the system to operate properly. Educaton of personnel and a good selling job are required initially. After a period of operation it was found that the best salesmen of the system are those who perform work as directed by the system.

By converting to a mechanized system of scheduling preventive maintenance many of the Air Force Civil Engineers' problems are reduced in scope. The ever present squeeze on manpower availability has become a daily problem. Those man-hours available must be used to maximum effectiveness if the Civil Engineering mission is to be accomplished. A reduction in Administrative load and a subsequent increase in maintenance capabilities is brought about by a mechanized scheduling system.

The need for close coordination between operating units is becoming more critical as maintenance reaction time is reduced. Coordination consists of two factors; 1, delineation of responsibilities and 2, maximum intercommunication with minimum effort. Assignment of individual responsibilities and establishment of channels of communication can only be done by directives. Once this is done and these guides fed into a mechanized system deviations are relatively eliminated. Also a simple but effective means of "feed back" communication is provided to allow the worker to converse with his superiors.

Once again the mechanized system of scheduling preventive maintenance is not a "method of performing maintenance". It is not a panacea or "cure all". But, as a management tool it will assist the engineer in accomplishing his maintenance mission with the best interest of the Air Force wired into the machine as an integral part of the system.

Refrigeration Improves Propellants

>>> REFRIGERATION is enabling the Rocketdyne Division of North American Aviation, Inc., to improve the quality of extruded solid propellants for rockets and missiles.

Solid propellants are currently regarded as the most potentially-feasible fuels for getting missiles to their targets and sending ships into outer space. But, due mainly to manufacturing problems, they haven't yet equalled the performance of liquid propellants which are relatively unreliable.

One of the latter problems was recently encountered by engineers at Rocketdyne's McGregor, Tex., plant. It was due to the tendency of high-burning-rate materials to be come hot when they are mixed.

Heat Slowed Work

In mixing older propellants, Rocketdyne was able to get satisfactory results by using a mixer with a jacket in which water cooled to 40° F. could be circulated. But in work with the newest of solid propellants, the water cooled jacket couldn't consistently hold temperatures below 135° F.

Consequently, continuous mixing was impractical and solid propellant materials frequently had such poor extrusion qualities that they could not be used after they were manufactured.

Rocketdyne engineers found this problem could be solved by dumping crushed dry ice directly into a water-cooled mixer containing a batch of solid propellant.

Effect of the dry ice is to hold the propellant's temperature down to about 80° F., and thus to reduce mixing time requirements about 30%.

Because they are softer and susceptible to minimal grain swelling, resultant propellants have better extrusion characteristics and are more useable in the fabricated condition.

The new refrigeration technique consists simply of dumping four 50-pound batches of crushed dry ice into each 450 pounds of propellant mix at intervals which assure the most uniform cooling action during a given mixing cycle.

USDA Reports Temperature Tolerance Of Frozen Ducks And Geese

>>> USDA tests show that frozen ducks and geese resemble other poultry in quality retention during their commercial life, in spite of their higher fat content.

This conclusion resulted from research in the Western Utilization Research and Development Division of the Department's Agricultural Research Service in Albany, Calif.

At 0°F., today's commercial packs of frozen ducks and geese hold up well for 9 to 12 months, according to A. A. Klose, A. A. Campbell and Helen L. Hanson, who conducted the study. In this respect they resemble frozen chickens and turkeys, investigated earlier.

Quality Loss

This low rate of deterioration at 0°F. is doubled, however, if birds are allowed to reach 10°F. and quadrupled at 20°F. The high quality shelf life of the birds is thus correspondingly decreased. Quality loss consists chiefly of staling or loss of flavor due to onset of rancidity of fat. Modern packages provide good protection against loss of moisture.

The investigators report also that rates of quality loss vary somewhat among all types of frozen poultry, but not enough to require special attention in commercial operations. The frozen geese were slightly less stable than the ducks. Whole eviscerated chickens have been found to be slightly more stable than turkeys and cut-up chicken. Modern processing techniques and packaging materials account to a considerable extent, they say, for the stability of frozen poultry of various kinds.

The Dow Chemical Texas Division in Freeport is one of the the largest users of cooling towers in their manufacturing processes. During the past 15 years they have made an intensive study of tower performance using the above installation as their study site.

Preserving Your Cooling Tower

»» NON-OXIDIZING chemicals have superior properties in cooling tower protection and control of algae and slime according to a report recently announced by The Dow Chemical Company on a 15-year cooling tower performance study.

The report was prepared by C. D. Carlson of Dow's Texas Division at Freeport. The performance check covered 15-years of cooling tower experience and highlighted data on specialized programs initiated in 1949 and 1958.

Experience Result

In a summary of the 10-page findings, this was the general conclusion:

"From the results of the cooling tower treating experience at Freeport, it is obvious that non-oxidizing chemicals such as sodium pentachlorophenate or commercial formulations containing blended chlorophenates as the main ingredients are superior to all other methods tried in the past, including chlorine."

The treatment records were compiled on a cooling tower serving a styrene plant in Freeport. The tower is in three units which have a common settling basin and actually operates as a single unit.

The system serves the styrene plant heat exchangers and contains a total of approximately 2,000,000 gallons of water with a daily circulation of 100,000,000 gallons and an average water make-up of 1,-700,000 gallons per day.

Started With Chlorine

When the tower was first put into operation in 1943, chlorine was used for biological control. However, algae control was difficult and mist eliminators required hand cleaning at least once a year. "Chemical white deterioration" (delignification) also proved a problem. Characterized by softened wood with a bleached appearance, the condition is thought due to chlorolignin formation. When alkalinity is high and excessive amounts of chlorine are used, the chlorine can react with the lignin in the wood and the wood quickly deterioriates due to separation of the cellulose fibers. The study indicated that even a low concentration of chlorine can initiate surface deterioriation of wood.

Second Study

The second phase of the study was initiated in 1948 when the entire cooling system was cleaned and sodium pentachlorophenate was circulated at 80 ppm. Within 24 hours after start of treatment, all signs of algae disappeared where direct water contact was made, the study showed.

Listed as main advantages of sodium pentachlorophenate over chlorine were:

1. A lower net cost.
2. A more thorough job.
3. Actual surface protection for wood was contrasted with the delignification hazard of chlorine.

The third phase of the test was initiated in 1958 when a large scale program was initiated to evaluate sodium pentachlorophenate and a commercially available formulation containing a blend of satur-

Here is a close look at the cooling towers at the Dow Chemical, Texas Division plant where the chemical treatment of towers has been under study. Towers circulate 100 million gallons per day. They are in three units with a common settling basin and operate as a single unit.

With Non-Oxidizing Chemicals

A summary of 15 years cooling tower experience and of an intensive study of chemical treatment of towers recently completed by Dow Chemical Company. Dow is one of the largest users of cooling towers and has compiled the study results in the hopes they will assist other tower operators in increasing tower efficiency.

ated and unsaturated chlorophenates as major ingredients.

Main objective of this phase was "to determine if a tower thoroughly fouled with algae and slime could effectively be brought under control with a heavy shock treatment of biocide and then maintained in good condition for an extended period by administering intermittent lighter dosages."

Second Objective

A second objective was to determine if the basic biological activity could further be increased by formulations which would aid pentration of sodium pentachlorophenate into the accumulated biological growth.

Observations

The conclusions read:

"Either sodium pentachlorophenate or commercially formulated products containing blended chlorophenates may be used successfully. It is apparent that the effective biocidal activity is derived from presence of chlorophenate . . .

"It was further shown that the formulated product containing blended chlorophenols had a detergent effect and was more effective in control of algae and slime . . . and that the formulated product permits smoother operation of the side-stream filter facilitating tower housecleaning."

The report concluded: "After more than 15 years of constant service, the No. 1 cooling tower at Dow (Freeport) stands in testimonial for chlorophenate treatment. The towers . . . were included in the studies made by the Cooling Tower Institute in cooperation with the California Redwood Association and were inspected in 1951, 1952, 1954, 1956, and 1958 by a C. T. I. field engineer. The exceptional condition of this tower was a strong factor in the conclusions reached by the California Redwood Association in a report of August 15, 1958, which states, 'The surface deterioration of redwood in cooling tower service may be virtually eliminated by avoiding the use of chlorine and using a non-oxidizing algaecide in the treatment of the circulating water'."

Help For Operators

The study results were compiled, Dow said, "in the hopes this information will be of assistance to other cooling tower operators in increasing their operational efficiency and in the preservation of their towers."

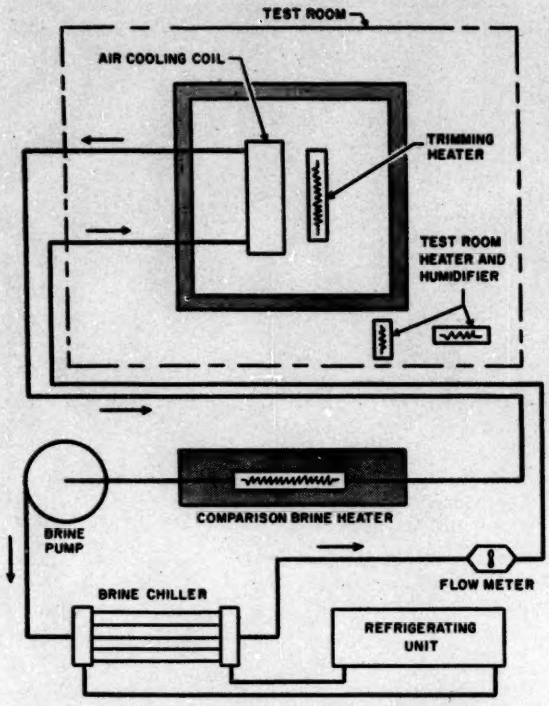


Fig. 1.—Schematic diagram of the heat sink apparatus developed at the National Bureau of Standards for measuring the cooling loads of refrigerated trailers. Two simultaneous procedures are used to determine the cooling load. In both procedures chilled brine is pumped continuously through the closed loop shown above. In the first procedure, cooling load is measured by a comparison between the temperature rise of the brine in the trailer and in the external comparison heater. In the second procedure, the cooling load is calculated from the temperature rise of the brine in the trailer and the mass flow of the brine as measured by the flowmeter. If the results of the two procedures agree within 5 percent, the rated cooling load is the average of values obtained by the two methods.

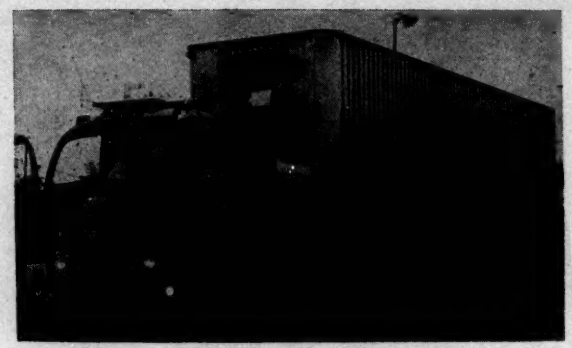


Fig. 2.—One of the four commercial trailers used by the National Bureau of Standards in developing the Standard Method for Measuring the Cooling Loads of Refrigerated Trailers.

Standard Method For Measuring Cooling Loads Of Refrigerated Trailers

A standard method for measuring the cooling loads of refrigerated trailers for rating purposes has been developed at the National Bureau of Standards. The standard rating method will enable trailer manufacturers to publish a rated cooling load for each model, thus aiding purchasers in selecting refrigerating units. Standard methods for rating weight gain and air leakage of trailers also were developed in the program.

»» A "HEAT sink method" for measuring cooling loads of refrigerated trailers and refrigerated structures has been developed by the National Bureau of Standards, in a program sponsored by the U. S. Department of Agriculture, the Quartermaster Research and Engineering Command of the Department of the Army, and the Truck-Trailer Manufacturers Association. The method was developed by P. R. Achenbach, C. W Phillips, and W. F. Goddard of the Bureau's refrigeration laboratory.

The heat sink method[1] is part of a Standard Testing and Rating Method for Refrigreated Trailers with Respect to Cooling Load, Weight Gain and Air Leakage, recently adopted by the Truck-Trailer Manufacturers Association. Previously there had been no standard cooling load measurement method for refrigerated trailers.

The standard testing and rating method will enable the trailer manufacturer to establish a cooling load rating for each of his models. The purchaser, knowing these ratings, and giving consideration also to the products being carried, the length of the haul, and other factors, will be aided in selecting the size of refrigerating unit best suited to his needs. He should be able to avoid selecting equipment either inadequate to deliver the food cargo in unspoiled condition, or unnecessarily costly for the job.

The standard method as adopted applies to refrigerated trailers of any length used for transporting frozen food or other materials at cargo space temperatures well below 32°F. The standard describes a procedure for measuring trailer cooling loads in the laboratory as

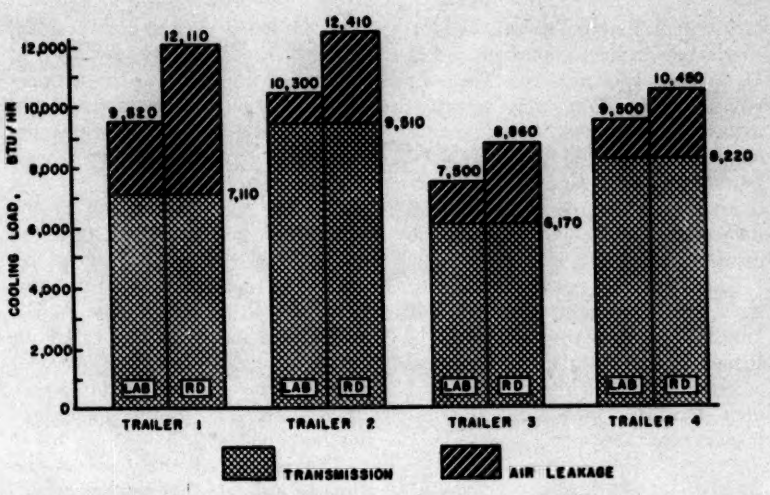


Fig. 3.—Bar graph showing the observed laboratory cooling loads before application of the pressurized plenum and the extrapolated road cooling loads of four commercial refrigerated trailers. The graph shows the computed values of cooling loads resulting from transmission and air leakage in each case. The pressurized plenum was added to the laboratory apparatus to simulate approximately the air leakage conditions during road operation.

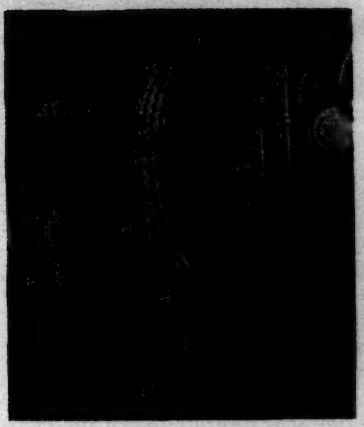


Fig. 4.—One of three calibrated, heavy-duty platform scales used at the National Bureau of Standards to measure weight gain of refrigerated trailers, caused by condensation and freezing of infiltrated moisture. The scales were placed under each set of back wheels and under the front at the king-pin position.

a basis for rating the trailers. Values obtained in this way represent the cooling loads under typical road speeds. The effect of ram air pressure on the front of a moving trailer is simulated in the laboratory during the rating test by means of a pressurized plenum.

Two simultaneous procedures—both employing the "heat sink" apparatus are used in the rating test in the laboratory to determine the cooling load under the standard test conditions of 0°F temperature in the trailer and 100°F dry bulb temperature and 50 percent relative humidity in the test room For purposes of both procedures, chilled brine is pumped through a closed loop which includes an air cooling coil inside the trailer, a comparison brine heater outside, a brine pump, a brine chiller, and an electronic flowmeter.

Under the first of these procedures, the comparison method, the cooling load is measured by a comparison between the temperature rise of brine in the trailer and in the external comparison heater. Under the second procedure, the cooling load is determined from the temperature rise of the brine in the trailer and the mass flow of brine as measured by the flowmeter. The results from the two procedures must agree within 5 percent for a given test to be acceptable for rating purposes. The rated cooling load is the average of values obtained by the two methods, expressed to the nearest 500 Btu per hr.

The heat sink apparatus serves both to produce the desired low temperature inside the trailer and to measure the rate of heat transfer into the vehicle. As developed at the Bureau, the apparatus consists of three electrically-driven two-speed compressors, with water-cooled condensers, a water cooling tower, two brine chillers, the brine pump, the external comparison brine heater, a cooling coil inside the trailer, and the electronic flowmeter and other suitable measuring instruments.

Comparison-Method

The comparison brine heater consists of a vapor-proofed, insulated box containing an electric immersion heater inserted in the brine line which passes through the box as part of its circuit. The electric energy consumed by the heater is measured with a calibrated watt-hour meter.

Since the brine flow rate in all parts of the closed brine circuit is the same, the ratio of temperature rise of the brine in the air cooling coil in the trailer to the temperature rise in the external comparison brine heater is equal to the ratio of the heat absorbed in the coil to that absorbed in the heater. (Changes in specific heat and the slight heat leakage are small enough to be neglected in these tests.)

After corrections for auxiliary heat sources inside the trailer, the above ratio is used to calculate the cooling load resulting from heat transferred through the trailer by transmission, air leakage, and frost accumulation.

Flowmeter Method

At the same time the closed brine circuit is providing data for measurement of the cooling load by the flowmeter procedure. The flowmeter is of the integrating type which registers the total mass flow of the brine by an electronic counting procedure. The cooling load is then calculated from the brine flow and the temperature rise of the brine in the trailer

If the results of the comparison method and flowmeter tests agree within 5 percent, the rated cooling load can now be calculated by averaging the two.

The brine used for the tests is methylene chloride, selected because of its favorable viscosity, and its stability of density and specific heat in the working temperature range, and because it is not excessively toxic or flammable.

Road Tests

In order to study the effects of air leakage and other factors encountered on the road, four commercial trailers were tested on the Ohio Turnpike as part of the Bureau's program. A modified heat sink apparatus was used to measure cooling loads during the road tests. Comparison of test results observed on the road and in the laboratory made it possible to simulate the road conditions of air leakage in the laboratory.

On the road, the flow rate of the brine was measured with the electronic flowmeter. Then the specific heat and the flow rate of the brine and its temperature change in the trailer cooling coil were used to calculate the cooling loads of the trailers. A comparison electric brine heater of reduced capacity was used at intervals to monitor the performance of the flowmeter.

Test Specimens and Equipment

Seven refrigerated trailers were used for the studies which served as a basis for drafting the Standard Testing and Rating Method. Four were commercial and three were military vehicles. The military vehicles were 7½ ton, 21-foot, single-axle trailers manufactured to U. S. Army specifications. The four commercial trailers were approximately 35 feet long. Their empty weights varied from 9,722 to 13,510 pounds All were designed for low-temperature service with 4 to 6 inches of glass fiber or rigid plastic insulation in floors, walls, and roofs.

The room used for the laboratory tests at the Bureau was 60 feet long, 14 feet wide and 16 feet high. It had insulated walls and roof and a concrete floor. A sliding overhead door permitted movement of semi-trailers into the space.

Weight Gain and Air Leakage

The Standard Testing and Rating Method, as adopted by the Truck-Trailer Manufacturers Association, provides that a Standard Weight Gain Rating and a Standard Air Leakage Rating should be determined for each trailer tested but need not be published in order to publish the Standard Cooling Load Rating. The weight gain and air leakage ratings will be useful to the manufacturer in future design and construction of trailers.

In rating trailers by the standard, the rated weight gain (caused by condensation and freezing of infiltrated moisture) is the average weight gain rate in pounds per hour for the final 24 hours of the test. It is expressed to the nearest 0.1 pound per hour.

For the air leakage test in the laboratory, air is forced into the trailer, and the amount of air required to maintain a positive pressure of 0.1 in. water gage in the trailer is measured. The rated air leakage is expressed to the nearest 0.5 cubic feet per minute, in accordance with the adopted standard method.

The results of the tests at the Bureau indicate that smaller refrigerating units could be used if air leakage of trailers could be eliminated, or alternately, less insulation might be required if air leakage were significantly reduced It is also probable that deterioration of trailer bodies would proceed more slowly if moisture could be kept out of insulation spaces.

[1] *For more detail on the heat sink apparatus, see Heat sink method for measuring the cooling loads of refrigerated structures, by P. R. Achenbach and C. W. Phillips, Proceedings Xth International Congress of Refrigeration, 1959.*

Production Process Line For Frozen Chickens

Reported In England

»» MECHANIZATION of frozen poultry processing at the Buxted Chicken Company's new factory in England is reminiscent of the Chicago meat packing plants. It has been planned for continuous flow as the demand for the product requires.

When the birds are received in the unloading bay they are put on an overhead conveyor, a single tubular track from which the load-bearing frames are suspended, each frame running on a pair of nylon rollers. Within seconds of being placed on the conveyor the birds are electrically stunned, killed and bled. A dip in the conveyor line immerses them in hot water, which assists the removal of feathers during their progress through the automatic plucking plant, after which they pass to the eviscerating section, where the insides of the birds are completely cleaned. Giblets are conveyed to another section for wrapping while inedible offal flows away in stainless steel channels.

Before freezing, body heat is removed in chillers. The birds enter at one end and pass inside a rotating drum which thoroughly immerses them in water, chilled by the addition of flake ice This ice is produced adjacent to the equipment by automatic icemakers and stored in insulated bins.

Reduced to about 40°F the birds go to the trussing section, where the wrapped giblets are inserted. They are then packed in plastic bags, from which air is subsequently evacuated, weighed, labelled, and placed on tiered trolleys ready for freezing. This is done by air-blast methods in two tunnels each approximately 60 ft. long, and believed to be the largest built for this type of installation. Finned evaporation coils are installed in each tunnel, operating on the ammonia pump circulation system, the air being circulated by double inlet fans. Air is delivered to the birds at not more than minus 40°F.

Refrigerating System

The refrigerating equipment for the tunnels consists of a two-stage ammonia compression plant, having separate low and high stage machines providing flexibility for load variations. Low stage compression is produced by three vertical single acting ammonia booster compressors, while two twin cylinder compressors provide high stage compression.

Designing Non Recirculating Air Conditioning Systems

Non recirculating air conditioning systems are required in hospitals, laboratories and other buildings where an explosive or toxic atmosphere may exist. Such buildings require 100% fresh air systems.

By ELLIOTT R. WHITMAN

»» THERE have been a number of small air conditioning dealers throughout the country who have found themselves in a position of having insufficient know-how to design and install systems which did not recirculate air. These systems are simple to design once the procedure is learned. This article will endeavor to explain the procedure of design, control and operation of such systems.

Where are 100% outside air or non recirculating systems used?

These systems are generally found in places where explosive hazards exist, in laboratories handling chemicals giving off toxic fumes, in locations where dangerous bacteria may be present and in spaces having radioactive materials.

Perhaps one thinks that there isn't a single such requirement within a hundred miles of their city. However, there are few cities that do not have at least one such facility. The conventional operating rooms in small clinics and hospitals are good examples. These systems should not recirculate air because of the danger of air borne bacteria. Until recently, the National Board of Fire Underwriters had criteria precluding recirculation of air in this type of application because of explosive hazards. However, they no longer consider hospital operating rooms as hazardous.

There are several reasons which may have caused them to lower their standards. One is that recent new discoveries in anesthesia have been such that almost all medical operating procedures utilize non explosive anesthetics or spinal injections. In addition, smaller quantities of gases are carried into the operating room than formerly. Another reason may be that previous explosions in hospital operating rooms have resulted in little or no damage to the building or content. As the National Board of Fire Underwriters is believed to be primarily interested in the prevention of claims against fire insurance policies on real estate facilities, these requirements may be considered no longer of interest to fire insurance underwriters.

A short time ago the author was assisting in the design of a hospital which was scheduled to receive Federal funds for its construction. As usual, the owners were insisting on large areas, expensive finishes and architectural treatment for aesthetic reasons and making every effort to cut cost of mechanical equipment. One of the medical men on the board had recently read an article stating that re-evaluation of the explosive hazard indicated that the National Board of Fire Underwriters no longer considered it a hazardous area. However, as the hospital was scheduled to receive some Federal funds for its construction, the minimum criteria published by the Public Health Service had to be followed. These criteria specifically required one hundred percent outside air. In an effort to reduce the overall cost of the mechanical equipment, a trip of some five hundred miles

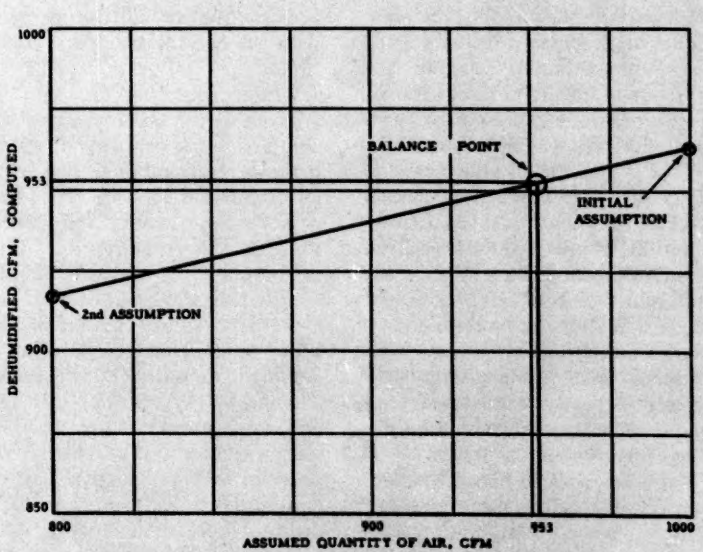


Fig. 1—Method of determining minimum air quantity.

was made to discuss informally the outside air requirements with a mechanical engineer employed by that agency. Part of this discussion related to the possibility of obtaining a waiver to their criteria based on the re-evaluation of the explosive hazard by the NBFU. This capable engineer explained that the Public Health Service requirements had never been based upon the possibility of prevention of explosions, but rather were based upon the control of harmful bacteria. It was further indicated that this agency had no plans to lower their criterion. Therefore, it appears as though non recirculating air conditioning systems will continue in vogue so long as matching Federal funds are available for local hospital construction.

As may be expected, the systems employing non recirculating air require large refrigeration capacities per unit area. The author has long used a rule-of-thumb method for quick estimating. This is approximately 90-100 square feet per ton of refrigeration. Sometimes this value is on the high side with additional capacity being required. This is approximately three to four times as much air conditioning as one would normally expect for a circulating system.

Analyze Heat Gain

In the development of a heat gain analysis, every effort should be expended to reduce the utilization of double glazing or special heat resistant glass and/or the elimination of all glass, utilization of the maximum insulation possible, the reduction of electrical lighting loads to the minimum consistant with need, the removal of all unnecessary heat generation equipment to adjacent rooms, etc. The person making the heat gain evaluation should make every effort to analyze the situation carefully and place the minimum factor of safety in every calculation, and yet, he should have enough know how of the air conditioning "arts" to come up with sufficient capacity at maximum load conditions after the condenser has an average amount of scale.

These are critical, because unless carefully evaluated, the owner has to buy extremely costly safety factor or gets insufficient capacity for maximum load conditions.

Outside air is the one big load in applications of this type. To achieve maximum economy the outside air requirement must exactly balance the dehumidified air requirement at maximum load conditions. If too little outside air is supplied, the volume supplied to the space will not provide adequate cooling. On the other hand, too much outside air will result in too large a system with unnecessary initial capacity and an extremely high utility operating cost. The minimum quantity of outside air requirements can be determined from a conventional heat gain analysis. However, a minimum of three heat gain computations are required after determining all factors except the amount of outside air required.

Use By-pass Factor

Any type of heat gain analysis format is satisfactory but best results will be obtained from one that makes use of a by-pass factor in the computations. These procedures have been published in booklet form by the Heating, Piping and Air Conditioning Contractors National Association, Suite 1843, 30 Rockefeller Plaza, New York, New York and by a number of manufacturers. A by-pass factor of 0.1 should be used for packaged air conditioning applications employing one hundred percent outside air instead of the 0.3 normally used in unitary equipment. This reduction in by-pass factor is possible because the air will be in contact with the coil for a longer period of time.

After computing the heat gain analysis in the recommended manner, assume a quantity of air that may be reasonable to expect for an application of this type. Insert it in the air quantity and continue through the computations. If the dehumidified air quantity required to dissipate the sensible heat is almost identical (say within two percent) to that assumed, then the assumed quantity is satisfactory. The probability is that this value will be incorrect. Now, assume a second quantity of outside air. The previous heat gain analysis showing dehumidified air required will indicate whether this amount should be larger or smaller than the initial assumption. Work the heat gain analysis as previously accomplished and arrive at a second dehumidified cfm. This second computed value will probably not correlate the assumed quantity of outside air. However, the exact quantity of air required can now be determined.

See Figure 1.

Take a sheet of cross sectional graph paper and lay out to the largest scale possible the assumed quantities of outside air on one axis and the computed dehumidified air on the other axis. Plot these two points and draw a straight line between them. Analysis of the curve will show that one, and only one, point exists where an exact balance is possible between assumed and computed air quantities. A third heat gain analysis using this intersection value for outside air should be made to gain assurance that errors have not been made in previous computations, in plotting the points and in reading the chart. The assumed outside air quantity should now be almost identical to the computed dehumidified air quantity.

This quantity of air is considerably less than the normal adjustable pulley range on equipment. Therefore, it will be necessary to replace the original factory pulley with one that gives less speed. A savings can generally be achieved by using a smaller drive motor but usually the motor supplied by the manufacturer is left on the equipment.

Initial installation of a non-recirculating air conditioning system is more expensive than a conventional application because considerably more equipment and additional controls are required. An on-off compressor cycle of cooling is not possible in this type operation as this procedure would cause alternate blasts of hot air as uncooled outside air was brought into the space. Consequently, continuous cooling will be required with reheat being added to make the space conditions comfortable. Unless reheat is added the temperature in the conditioned space will be too cold except at maximum load conditions.

Steam or hot water coils are generally used for reheat although electrical resistance heaters are

sometimes used. The primary disadvantages of electrical resistance reheating are high energy charges and high control cost to obtain close-step incremental reheating. The size of the reheating media should be based on the heating requirements of the space. That is, the reheat system should be sized to just balance the maximum heat loss of the space plus the heat required to raise the quantity of outside air from 60°F to 75°F. In mild climates, this should be checked against the capacity of the cooling coil. The reheating coil should be of at least the same capacity as the cooling coil. Oversizing of a reheat system will cause the system to hunt between overcooling and undercooling.

Preheating of the outside air is highly desirable in mild climates and is mandatory in moderate winter climates. Preheaters are usually sized to bring the outside air from design conditions to 60°F. This permits final winter heating to be accomplished without great changes in the setting of the final control valve and consequently permits the space to be maintained at a more uniform temperature.

In mild climates such as found along the extreme Gulf Coast and Southern California, an economy system can get by on a reheat coil alone, but this procedure is not recommended.

An interrupting control is generally placed on the preheat coil modulating valve to break the control circuit operating the cooling tower and-or the compressor. This precludes the wasteful operation of this equipment when the temperature of the outside air is capable of providing all necessary cooling.

With preheat, cooling, and reheat being provided, additional control is needed in some applications. Under hazardous conditions where an explosion could be set off by a static electrical discharge, all precautions must be exercised to prevent their build up. One necessary application is to maintain the relative humidity within the space above 55 percent. Numerous methods are available to keep the humidity high. The specific method to be utilized will depend upon the space available for equipment, availability of other utilities and other factors.

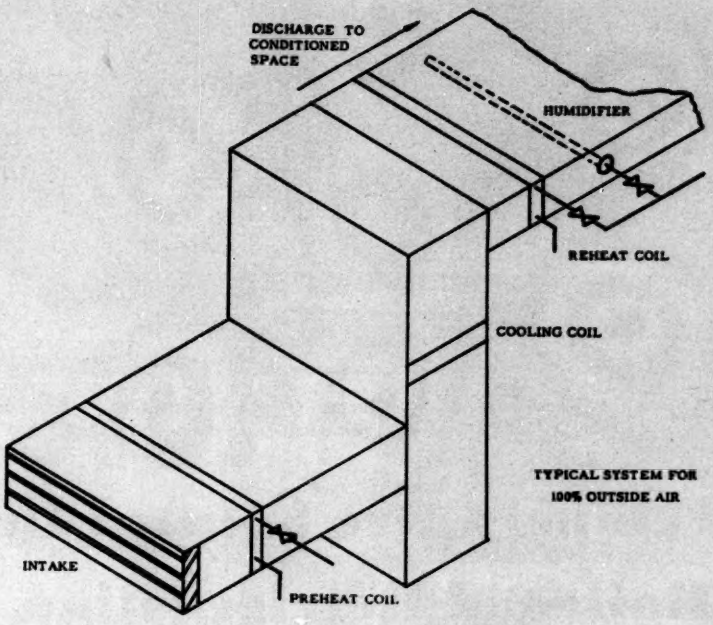


Fig. 2

One of the simpler methods is to utilize a modulating steam valve that discharges raw steam in the duct downstream from the heating coil. Generally, this consists of a small pipe drilled with a number of holes. This pipe is then wrapped with a type of asbestos cloth that forms a wick. This permits some humidification when the steam is readily available. It also requires the least amount of space within an equipment room. The space criterion is generally a very important consideration. This method of humidification has two distinct disadvantages. The boiler water has generally been treated with numerous chemicals to prevent scale and corrosion. The chemicals are discharged into the conditioned space in minute quantities and they may be objectionable from a toxic, odor, or other standpoint. Too, personnel having charge of treatment of the boiler water may strenuously object, and rightly so, to any deliberate discharge of steam over a continuing period. Loss of steam causes an unbalance. This necessitates additional chemicals being added and is a rather tricky process. Operators generally have enough trouble maintaining a chemical balance even when no loss occurs. Consequently, every effort is made to prevent water losses.

Another simple method employing small space and steam or hot water is the conventional pan type humidifier that evaporates water to the air. Water level in a pan downstream from the reheat coil is maintained by a float valve. The water is caused to be evaporated by use of heat applied through a modulating valve supplying a coil in the bottom of the pan.

Some applications for high humidity make use of spray atomizers that break water into a fine mist and spray it directly into the space. This type of humidification has been successfully used in the textile industry for many years. It is simple, efficient and cheap to install and maintain. However, it presents an unsightly appearance and is seldom used except for industrial applications and in research laboratories where the public does not visit.

When humidity must be maintained within close tolerances, the so called dew point method must be used. This requires considerable space to install the necessary additional equipment. It costs considerably more than any of the other methods. Generally, a water wash system of some type is placed immediately downstream from the cooling coil. A thermostat is placed further downstream as far as practical but ahead of the reheat coil

Continued on page 28

Mechanical refrigerated car on the Chicago Burlington and Quincy Railroad. Mechanical equipment includes refrigeration and heating system.

Temperature Control In Railroad Refrigeration

Needs Shockproof Instruments Here Is a Suggested Answer

By WAYNE A. McGREW, Vice Pres.
Partlow Corp., New Hartford, N.Y.

»» THE development of dependable mechanical refrigeration cars for the nation's railroads has had as one of its major hurdles the development of temperature control instruments accurate enough to maintain the precise temperatures required and still hold up under the hard knocks of railroad operations.

Industrial control engineers, working with the development engineers, refrigeration compressor manufacturers, reefer car builders, railroads and operators have evolved lines of hybrid temperature controls which not only are meeting the special railroad requirements for sturdiness and long-term serviceability.

Inside the refrigerator car are these Partlow recording thermometers in the engine compartment which indicate ambient temperature, temperature of the coil, temperature into the coil. In addition to this the compartment is equipped with Partlow thermostat controls.

Temperature control for cars used in frozen food transport is a specially complex problem. The low temperature cars, operating usually at -10 to zero F., usually involve the use of two stages of refrigeration, plus a heating circuit.

On initial pulldown from ambient temperatures, the temperature control calls for both refrigerating compressors to be in operation. As the temperature is pulled down to the control set point, one compressor is deactivated by the control. If the remaining compressor continues to pull the temperature down below the control set point (as would be the case if the outside ambient temperature were low), the second compressor is turned off. If the temperature continues to fall below the set point, the control automatically actuates the heating circuit.

In a road condition where the reefer car is traveling through desert-like climates and the control requirements are at zero, the heating cycle will most likely never be used. The heating cycle is not used in refrigeration control but actual heating is used for automatic defrosting. But, if this same car travels through sub-zero temperatures, as would often be encountered in mountainous country, the temperature control would be likely to utilize the heating cycle alternately with one of the refrigeration cycles in order to maintain the preselected load temperature.

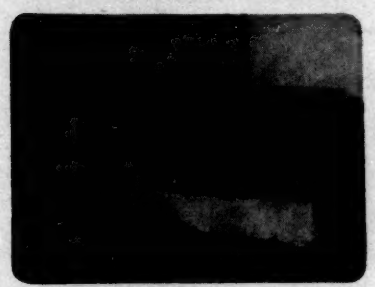
For cars used in perishable commodity transport using the higher range of refrigeration only, (32 to 70 degrees) a control has been developed to operate with a system closely akin to the heat pump or reverse cycle system. The system utilizes a single compressor which provides both heat and refrigeration, through the use of a three-way valve which simply reverses the flow of refrigerant to alternate the function of the evaporator and the condenser Under this system the compressor operates at a constant speed without cycling. The control incorporates a single switch which controls the position of the

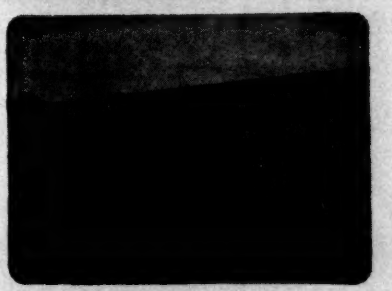
*throw your compressor out!**

*outside that is!

STOP

wasting costly building space!





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Completely assembled, wired, tested and factory run-in, the units arrive on the job ready to operate. Simple hookup eliminates costly installation and control adjustment time. Kramer's Outdoor Condensing Units end waste of valuable indoor space. WRITE FOR BULLETIN

KRAMER TRENTON CO., Trenton 5, N. J.

47 YEARS OF CONTINUOUS ACHIEVEMENT IN HEAT TRANSFER

three-way valve providing heat or refrigeration as called for by the mercury sensing bulb.

One of the important early problems encountered with temperature control by the railroads and their suppliers was the ever present road shock and vibration problem. This factor has automatically almost eliminated the use of many temperature control instruments effectively used in stationary industrial and commercial applications, requiring the same accuracy and sensitivity.

Delicate bi-metallic, bellows or electronic type temperature instruments commonly found in stationary applications have been found generally to lack the power required to positively actuate the switches in reefer-car applications and to resist the road vibration and shock encountered by these cars in road service.

Railroad and many truck refrigeration men have for the most part standardized on the filled system which operates on the principle of differential of expansion between a medium enclosed in a sensing bulb and the bulb and capillary metal. The medium used is usually mercury. In reefer-car application, the mercury-filled bulb is suspended in the cargo space in a location which assures that it receives the greatest possible amount of air circulation. The medium in the bulb expands or contracts in direct proportion to the heating or cooling of the air in the cargo space. This action is transmitted through a capillary tube which runs through the wall of the cargo space to the instrument itself and works directly against a flexible diaphragm. The diaphragm movement, in turn, exerts a pressure against levers which actuate whatever switches are necessary in the system.

The pressure exerted by the mercury-filled system is extremely powerful as it is derived from the fact that mercury is virtually incompressible. The internal pressures of a mercury bulb are as high as 300 psi. This positive pressure exerted against the diaphragm permits the direct operating of levers without added electronic or other outside amplification. The levers and linkages are not required to be delicate in this system.

Simplicity of a filled system has been found to be a major advantage for railroad reefer use. Service problems with a mechanical system of this type is minimum as compared with industrial control systems involving electric circuits.

Filled system controls have an added feature important to railroad application, the easy field replacement and interchangeability of thermal sensing elements. In order to replace a thermal element, it is only necessary to remove two screws and a flange holding the element to the instrument body. A replacement element may be quickly substituted. The instrument is then re-zeroed by using a checking thermometer whose bulb is attached directly to the new bulb of the control instrument. Switch replacement by semi-technical railroad servicemen is also possible.

Railroad reefer controls are available in indicating and non-indicating types. The incorporation of an indicating dial has as its pricipal advantage the fact that no additional checking instrument is necessary in order to monitor the function of the control. The setting pointer utilizes the same scale as the indicating pointer.

Reefer control engineers are also looking to the future possibility of using recording controllers . . . a trend which seems to be on the increase in the trucking industry. The possibilities inherent in a chart record of minute-by-minute in-transit load temperatures are obvious, and this feature is expected to be an important part of the reefer controls of the future.

18 Foot Freezer Chills 500 Pounds of Metals

»» AN 18-ft. long refrigerator recently installed by the Convair Division of General Dynamics Corp., San Diego, Calif., is greatly improving the properties of exotic steel parts for jet transport aircraft. (See front cover).

Need for the big box, which can chill as much as 500 lbs. of metal in one operation, is due to the fact that certain metals such as stainless steels must undergo an internal transformation before they can be aged for maximal strength in the heat treated condition—since the transformation will take place in a most satisfactory manner if the materials are refrigerated.

In the new refrigerator, Convair can reduce the temperature of a full load of metal parts from 70°F. to -150°F. in an hour. Thereafter, the latter temperature is held for an hour to facilitate transformation.

During the subsequent aging process, slightly-elevated temperatures reduce the amount of time the metals would normally need to attain their best mechanical strength.

Non-Recirculating Systems

Continued from page 25

and protected from it so that radiant heat will not have any effect on the device. A pump is used to spray atomized water directly into the flow of air as it leaves the coil so the air is fully saturated at the temperature of the thermostat setting. This results in the air entering the reheat coil being at a constant temperature and humidity. That is, its dew point is controlled. With this thermostat controlling the cooling coil, any on-off fluctuations of the solenoid valve of a direct expansion system will flatten out as the temperature of the water being sprayed will generally approach the dew point setting. As the room conditions will vary from time to time, a reset type of controller will be required to change the setting of the dew point controller to maintain constant conditions within the space.

Whenever practicable, it is desirable to employ two isolated refrigerant circuits when direct expansion is employed. This permits major maintenance of one system during the intermediate season during normal working hours without shut down of the system. Such a system gives a safety factor in event of refrigeration system break down. It also is considerably cheaper to operate.

Frozen Food Industries Adopt Unified Handling Approach

»» NINE national trade organizations have joined together in a uniform program to coordinate frozen food handling from processor to retailer, it was announced recently by the organizations involved. The program was unanimously adopted after indications pointed to the possibility of a number of separate and distinctly different regulations being promulgated by various states. In announcing this program, the organizations stated that the frozen food industry has long recognized the desirability of achieving a 0°F. goal, but that the achievement of this goal in a reasonable and practicable manner includes recognition of the responsibility of industry to continue to provide the public with adequate supplies of quality frozen foods without interruption. In order to assist all segments of the frozen food industry in their programs, standards of industry practice are being developed by each section of the industry.

This unified program with its statement of policy was subscribed to by the American Trucking Associations, Burlington Refrigerator Express-Fruit Growers Express-western Fruit Express, Institute of American Poultry Industries, National Association of Frozen Food Packers, National Association of Food Chains, National Association of Refrigerated Warehouses, National Association of Retail Grocers of U. S., National Fisheries Institute, and National Frozen Food Association.

The frozen food industries vigorously oppose the adoption as statutes of regulations of the AFDOUS Code with its unrealistic provisions. The organizations said they will oppose adoption of such a code as a regulatory measure for application at any industry level.

The following statement outlines a frozen food program and policy statement endorsed by the participating national trade organizations. It has been mailed to all members of AFDOUS.

Food Industry Program On Frozen Food Quality

The food industry of the United States—from producer to retailer—has provided the highest quality of food at the lowest possible prices, anywhere in the world.

Maintenance of quality in frozen foods has been and will continue to be a major effort of the entire food industry—producers, processors, transportation agencies, warehousemen, distributors and retailers.

In order to assist all segments of the frozen food industry in their programs of progress, standards of industry practice are being developed by each section of the industry.

Industry's Goal

The industry has long recognized the desirability of achieving the goal of a reasonably uniform

BASIC REFRIGERATION

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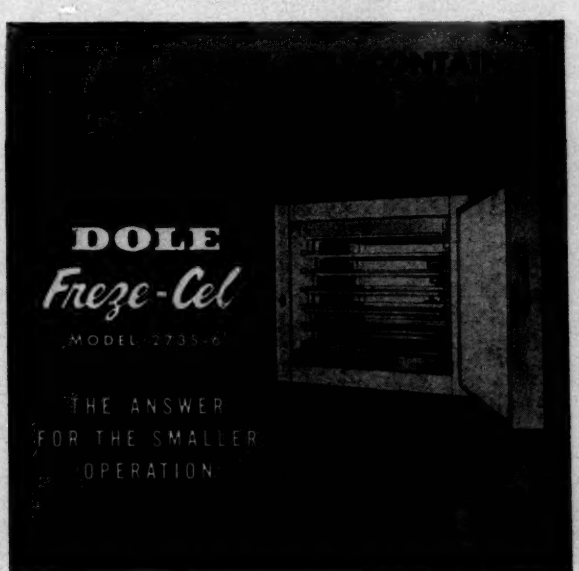

6-Station unit: 240—5" x 4¼" packages per freeze . . . all refrigeration and hydraulic equipment self-contained . . . uses R22 refrigerant . . . only 17 sq. ft. of floor space required . . . patented DOLE "Thermo-Film" feature increases freezing speed up to 10% . . . installation requires only electrical, water and drain connections.

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Canada: Dole Refrigerating Products Limited, Oakville, Ont.

temperature of 0° Fahrenheit for the commercial handling of frozen foods and continues to approve further emphasis on progress toward that goal; recognizing, however, that all frozen foods do not require the same temperature levels for proper preservation, that others which are produced as frozen foods are sold in a defrosted state, and that the goal of 0°F. should be approached in the light of these considerations. The achievement of this goal of product temperature in a reasonable and practicable manner includes recognition of the responsibility of industry to continue without interruption to provide the public with adequate supplies of quality frozen foods.

The food industry calls attention to the findings resulting from the extensive studies in the time-temperature-tolerance field conducted by the Western Utilization Research and Development Laboratory of the United States Department of Agriculture, and concurred in by The Refrigeration Research Foundation. It is established, and these studies show, that quality change does not result solely from higher product temperatures, but more importantly, from length of time of exposure at a given temperature. If exposure of a product to higher temperatures has continued for such time as to make probably a material change in quality, that product should be withdrawn from the market for testing.

Industry's Policy

In all areas, from producer to retailer, quality maintenance will be better accomplished by voluntary industry action than by governmental regulations. The frozen food industries are preparing over-all standards of industry practice for the benefit of all concerned.

The frozen food industries vigorously oppose the adoption as statutes or regulations of the AFDOUS Code, with its unrealistic provisions, and will oppose adoption of such a code as a regulatory measure for application at any industry level. The operation of the code would deprive consumers of substantial supplies of frozen foods by reason of the operation of such statutes and regulations. The industry's cooperative program is the most practicable means of achieving the goal of maintenance of optimum quality of frozen foods.

The memberships of the various industries involved will coordinate all their activities in carrying out a unified program through their national associations.

USDA Agricultural Research Reports

»» BECAUSE dehydrofrozen apples have proved usable and attractive to pie bakers, USDA research engineers have conducted studies aimed at lowering of costs and other improvements in manufacture.

Investigations recently conducted by M. E. Lazar, E. O. Chapin, and G. S. Smith, engineers in the Department's Western Utilization Research and Development Division in Albany, Calif., were reported at the annual meeting of Institute of Food Technologists May 17 in San Francisco.

This partially dried, frozen product is commercially produced to a moderate extent. It offers savings of 50% in weight and space and appropriate control of water added when used in pies or other manufactured foods.

The engineering studies, presented by Mr. Lazar, have shown that through-flow drying is more effective than previously used cross-flow, and have provided information for use in solving problems associated with sulfur dioxide treatments used to prevent darkening of slices.

Since only 3 to 10% of the sulfur dioxide in treated fresh slices remains in dehydrofrozen apples baked in pies, levels higher than previously established can be used in processing. With levels as high as 400 ppm., drying air with high humidity is not required to control penetration into the slices in the new method. The report includes recommendations on piece size and dipping conditions most suitable for the partial dehydration, which precedes freezing.

An optional step, according to the report, is use of steam blanching before the sulfured, partially dried slices are frozen. Blanched slices are so pliable that 25 to 35% more can be packed into a container. In addition, blanching precludes any possibility of dark centers due to inadequate penetration of SO_2.

The studies show also that a new product, unsulfured dehydrofrozen apples, can be made from fruit treated with salt and citric acid. Drying temperature, however, must be mild and blanching must follow partial dehydration without delay.

Studies on freezable salad dressings

Progress in USDA research on a salad-type dressing that freezes and thaws without separation was reported May 17.

The studies were conducted in the Western Utilization Research and Development Division of USDA's Agricultural Research Service in Albany, Calif. by Helen L. Hanson, Lorraine R. Fletcher, and Leo Kline.

At present, according to Dr. Hanson, the project has developed a standard salad dressing, containing 30 percent oil and 5.3 percent egg yolk, that is stable at 10° F. and higher. In addition the studies have shown how changes from the standard formula can be made to produce more stable dressings for holding at lower temperatures. The selection of the three major ingredients has been shown to be important.

Of 6 vegetable oils studied, safflower oil was most promising. It does not crystallize at 20° F. and can be winterized for improved stability at 10° F.

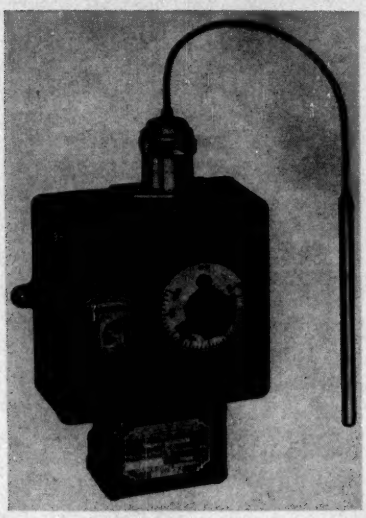
Of 4 starchy thickening agents tested, waxy-rice flour produced the most cold-stable dressings. Increasing the proportion of egg yolk increases stability as does the use of freshly prepared rather than salted frozen yolk.

Dr. Hanson said that food processors are interested in new techniques that permit freezing of emulsion-containing salad dressings without separation of water and oil when thawed. Such techniques would make possible a greater variety of foods, including salads and sandwiches, that can be frozen in quantity and thawed just before use.

New Products Designed to Improve Operation

Explosion-Proof Non-Indicating Control

THE temperature control, designed especially for use in hazardous locations, has now been made the standard explosion-proof non-indicating instrument of the Partlow Corporation, New Hartford, New York, according to the firm's engineering department.



Used for refrigeration or heating applications, the GVS control incorporates a number of improvements, not only in field performance, but also in manufacturing efficiencies, it was maintained.

It incorporates in a sealed enclosure, a snap-acting switch to control an electrical circuit actuating valves, solenoids, motors, heating elements or other appliances. Temperature is sensed by a mercury-filled thermal element placed in the medium to be controlled.

Expansion and contraction of the mercury reacts against a diaphragm in the element head, which in turn actuates a lever mechanism within the instrument to operate the switch. A setting knob positions the actuating mechanism in relation to the switch by means of a precision cam, to establish the control point.

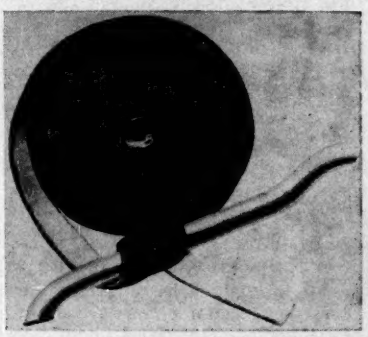
The internal mechanism is of heavy rugged construction. The lever system is steel, cadmium plated or stainless steel, and the dial scale is porcelain enameled. The instrument may be used to sense and control temperatures from -30 to 1100 degrees F. A variety of ten ranges within these limits are offered.

Wrap-On Pipe Insulation

INSUTAPE, a wrap-on asbestos insulation that is both flameproof and weatherproof, has been announced by Union Asbestos & Rubber Company, Fibrous Products Division, Bloomington, Illinois. It is designed for a wide variety of industrial applications requiring an easy-to-apply, economical insulating material.

This product is especially adaptable to insulating work under difficult clearance conditions, and for bent or curved instrument lines and pipe.

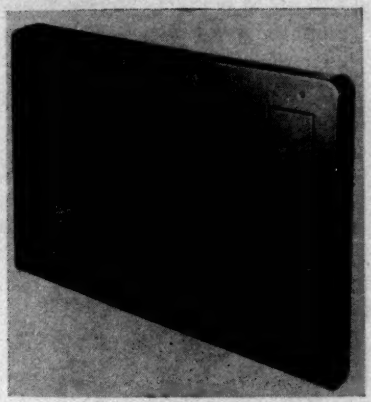
Since Insutape withstands ravages of weather, vibration, and intense heat, it provides permanent insulation and personnel protection, even under extreme conditions. It can be removed and reapplied without loss of insulating efficiency, thereby reducing insulating costs. Insutape consists of long-fibered asbestos rovings, completely enclosed in a tubular, woven asbestos jacket. The exposed surfaces and edges of the jacket are heavily coated with Neoprene. This tough, abrasion-resistant covering is essentially non-combustible and resists penetration of moisture, oil and grease.



A snug fit around the pipe is quickly achieved by working spiral wrappings with the hands and pressing tape edges firmly together to assure maximum conservation of heat. Wire bands or clamps used at intervals hold the Insutape firmly in place.

Heating-Cooling Units

NEWEST in the complete line of Dunham-Bush "CR" heating-cooling units is the "CRVR" model with finished front for total recess and spacers for semi-recessed mounting. The new unit is available in four sizes with direct expansion coils in various cooling and heating capacities.



The unit is designed for maximum space saving in air conditioning areas and is highly desirable for offices, motels, hospitals, and other installations where space is of major monetary consideration. Its features include individual room control, attractive appearance, quiet, reliable and economical operation, easy installation, filter controlled cleanliness.

PIPE BENDS

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the tougher the job, the better our expert metalworkers like it. With their modern equipment, they produce the finest work to your precise specifications. In any metal, even stainless steel, or up to 6-inch extra heavy. For fast, quality bends, backed up by more than 40 years specialization, call on us!

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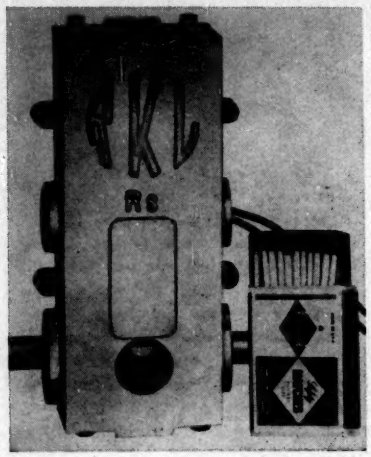
Solenoid-Operated Valve

A NEW solenoid-operated pinch-type valve that can be used for metering, sampling, or "on-off" control in applications involving corrosive fluids, slurries, dry powder, or sanitary products has been announced by RKL controls, Inc. Capable of providing absolutely gas-tight shutoff under vacuum or pressure conditions, the new valve is made in sizes up to 1".

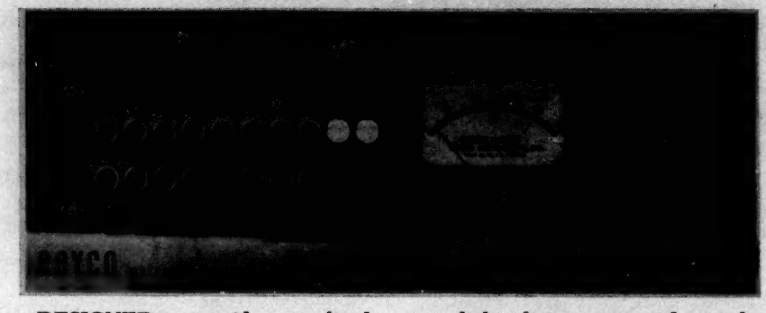


The valve consists of a rubber body that is pinched closed by the spring-loaded solenoid mechanism. There are no moving parts in the fluid stream, and no seats, discs, or packing glands to leak. The simple design principle is completely free of any cavities, and permits straight-through flow in either direction. The unit has been extensively field-tested for more than a year without requiring any maintenance. It weighs 4.5 pounds, and measures 2-1/2" x 7-1/4" x 3-1/4".

A normally-closed, energized-to-open valve, the Rs can be operated manually or from programmers, alarms, timers or automatic sensing instruments. Standard valve bodies are of pure gum rubber with a maximum pressure rating of up to 50 psig for the smallest size. The standard maximum temperature rating is 180° F. Synthetic-rubber valve bodies of Buna, Butyl, Neoprene, Hypalon or Viton can be supplied for higher temperatures or other special requirements on lower-pressure applications.

The new RKL solenoid-operated valve is furnished in body sizes from 1/16" up to 1". The inside dimensions of the bodies correspond to the outside dimensions of standard metal tubing sizes within this range. Two hose clamps are provided to tighten the connection once the metal tubing has been inserted in the body. The Rs Series valve operates on standard 110V, 60-cycle power, but can be supplied in other voltage ratings. The entire valve is encased in a cast aluminum housing that can be epoxy coated for corrosive atmosphere applications. Mounting brackets are furnished separately.

Temperature-Monitor System



DESIGNED to provide centralized observation of ambient temperatures in a multiplicity of areas operated by a single organization, the Royco Type-Z Temperature-Monitor System offers advantages for refrigerated and air-conditioned buildings—especially low-temperature food-storage facilities. There is essentially no practical limitation to the number of areas which can be monitored in a single installation.

Temperature capabilities range from -50 degrees F to 300 degrees F. Selector switches on the main panel provide for calibration and for room selection, a confirming indicator light being mounted nearby. Temperatures appear directly on an indicating instrument and are accurate to plus or minus 1 per cent.

These monitor systems are designed for the simplest possible installation. Sensor probes of plug-terminated types are provided and mating extension cables permit runs to be made as long as 4,000 feet. Cables plug directly into the rear of the indicating panels. This arrangement permits the immediate replacement or comparison checking of sensor probes. The central power supply of the unit operates on 115-volt 60-cps power and draws 4 watts.

New Pressure Hose

HYTRON Pressure Hose, of all synthetic construction for hydraulic and other high pressure applications is being offered by The Imperial Brass Mfg. Co., Chicago 48, Ill.

The hose consists of a seamless extruded inner tube of special virgin polyamide material, a high tensile strength polyester reinforcement and a cover of extruded polyamide formulation. Cover is black and is fluted for added torsional strength.

Minimum burst pressure is listed as 9,000 to 12,000 psi, depending on size. Temperature range is from -40°F to 225°F.

A complete line of Hytron reusable couplings is provided for assembly of hose, and hose assemblies can also be furnished with factory crimped-on couplings.

The new Hytron Hose represents the result of extensive research, it is stated, and utilizes the latest advances in plastic engineering materials to provide performance which exceeds that of wire braid rubber hose in many areas.

ABRASION RESISTANT POLYAMIDE COVER
TOUGH POLYESTER REINFORCEMENT
SEAMLESS POLYAMIDE INNER TUBE
HYTRON HOSE WITH REUSABLE COUPLING

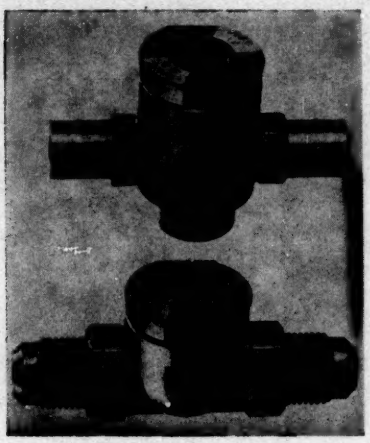
Applications include hydraulic lines, hot paint lines, solvent lines, refrigerant lines, fuel and oil lines, high pressure pneumatic service, high pressure CO_2 and oxygen lines and others.

Comprehensive data is provided in New Engineering Product Release NEPR-500, available from The Imperial Brass Mfg. Co., 6300 W. Howard St., Chicago 48, Ill.

New Products cont.

Liquid And Moisture Indicator

A ONE-PIECE indicator unit which screws out of the brass body is featured in Ansul Chemical Company's new combination moisture indicator and sight glass for refrigeration systems.



The "200" Dry-Eye combines a Refrigerant 12 indicator, a Refrigerant 22 element and a sight glass in one interchangeable assembly. The unit screws out of its brass body in one piece to permit soldering of sweat connections. With the indicator assembly removed, there is no possible way to damage the elements during installation. Once installed, the indicator body is permanently in the line, but the assembly containing the indicating elements can be screwed in or out at any time.

The Dry Eye's R-22 element gives specific moisture indication for Refrigerant 22. It is designed to provide the low relative humidity change point required to indicate a safe level. The element shows green for dry, pink for wet.

The Refrigerant 12 indicator shows pink when wet and blue when dry. It works equally well in systems using Refrigerants 11, 13, 113 and 114.

The indicator body is a one-piece brass forging, available in all standard sizes, flare and sweat, in both in-line models and T models.

Freezer Clothing

FREEZER-WEAR protective clothing insulated with a ¼" special high density urethane foam has been developed by the Freezer Wear division of The Flexa Corporation of America. Weighing less than 3½ pounds Freezer Wear permits men to work efficiently at 30° below zero for 2½ hours at a time.

Made to rugged industrial standards, these insulated garments eliminate the need for "out time". An illustrated catalog is available from the Freezer Wear Company, Kensington, Maryland.

Truck-Powered Refrigeration Unit

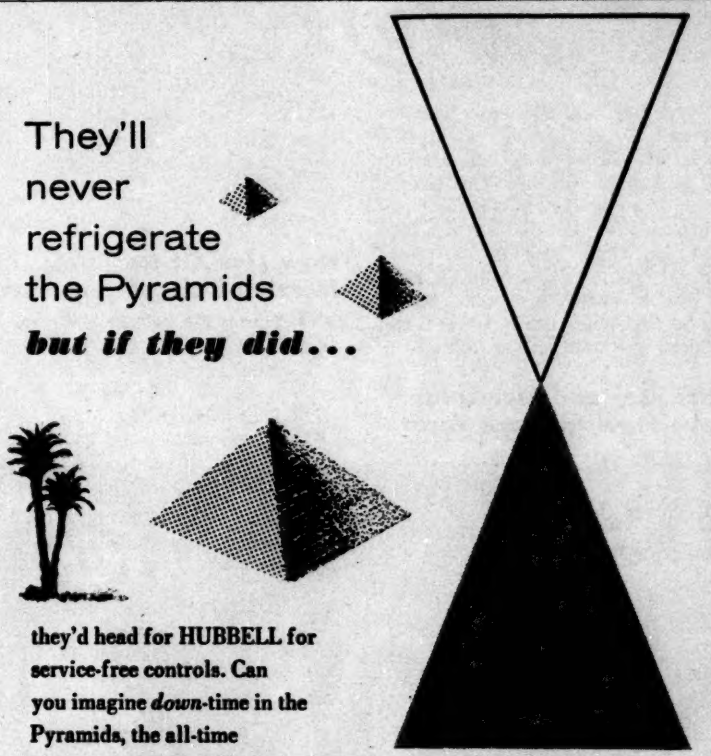
WEIGHING only 376 pounds, the Model C-10-B Hunter Refrigeration Unit is a heavy duty model especially designed for the efficient maintenance of temperatures for products 30° F or above.

Packing house products, milk and dairy products, as well as many other commodities requiring comparable protection can be delivered safely when utilizing this flexible equipment. Capacity-wise this model can be employed in adequately insulated bodies up to 18 feet long. The unit is also available (as Model CE-10-B) with AC electric standby power for dockside or over-night operation.

Powered directly by the truck engine, the Model C-10-B consists of a self-contained "factory package"

They'll never refrigerate the Pyramids

but if they did...



they'd head for HUBBELL for service-free controls. Can you imagine *down*-time in the Pyramids, the all-time champ of *up*-time? Neither can we. At HUBBELL craftsmanship care marks every production step, from foundry to finished controls. Down-time is engineered *out*.

They'll probably never refrigerate the Pyramids. **But if they ever do . . . *they'll pay a little more to get the best.***

REFRIGERATION • AIR CONDITIONING • INDUSTRIAL

VALVES

Service-free Controls

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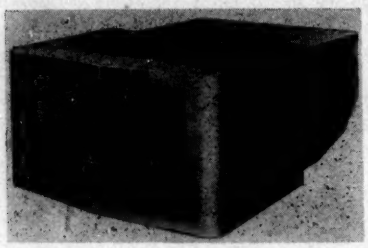
• BACK PRESSURE REGULATOR VALVES • DUAL PRESSURE REGULATOR VALVES • • AUTOMATIC SUCTION STOP VALVES • SOLENOID VALVES • GAUGES • • SAFETY RELIEF VALVES • 3-WAY REVERSING VALVES

"Castings to finished controls . . . every inch HUBBELL!"

that contains all components, except the compressor. This package is designed for mounting through a prepared opening in the upper front wall of the truck body. The high speed automotive type compressor mounts on and is driven by the truck engine, by a V-belt from the crankshaft. Flexible refrigerant hoses and connections are supplied.



Evaporator and condenser fans are powered by a 12-volt, ¼ hp d-c motor with heavy duty ball bearings and replaceable brushes. This electric motor drives both the evaporator and condenser fans continuously at a constant speed. It receives its power from the vehicle's generator. A manual "on-off" switch is supplied on the unit so that when refrigeration is not required the unit can be turned off.

Silica Gel and Molecular Sieve Now In Block Form

AFTER years of research, a block type filter-drier, combining Silica Gel P.A. 400 and Molecular Sieve, has been developed for the refrigeration industry. This accomplishment has

been made possible through a grant to the Industrial Chemical Research Laboratory of the University of Miami which is under the direction of Dr. Walter O. Walker, Dean of the Division of Research in Industry, one of the outstanding authorities on desiccants in the refrigeration industry, working in cooperation with the Alco Valve Company's research laboratory.

Extensive field testing of this new block type filter-drier has demonstrated that these desiccants, bonded in rigid form by an accurately controlled process which creates high mechanical strength, will not permit separation under liquid surging or severe shake-up. Further, the geometry of this block exposes maximum surface to the liquid flow and assures even distribution of filtered particles, resulting in filtration in depth, thus preventing rapid rise in pressure drop. These features assure longer filter-drier operational life.

In addition to the high filtering qualities, the combined desiccants absorb acids and colors and because of the low amount of binder required for mechanical strength, the Alco Dri-Kleaner contains nearly pure desiccants, making it possible to easily meet the ASRE-ARI Standards.

Full flow fittings of copper (ODS) and brass (SAE) minimize pressure drop through the connections. The copper fittings allow the use of all commercial types of brazing materials for sweat connections, while the brass flare fittings eliminate flare nut creep due to temperature changes of dissimilar metals.

New Line Of Ice Merchandising Equipment

»» TO MEET the growing consumer demand for 'packaged ice' Starrett is building two ice merchandising units especially adapted for storage and sale of packaged ice.

These are Models IM-24 and IM-38, each with a capacity of sixty and one hundred 10-pound packages respectively.

The floor space required by the IM-24 is 3′ x 3′. For the IM-38 it is 3′ x 4′. These units are not coin operated but do provide self-service for walk-in customers in line with the policies of drive-in type markets.

Ice Manufacturers are gaining new profits (more dollars per ton) by placing these Starrett Ice Merchandisers at service stations, drive-in type markets and picnic areas.

Ice machine dealers also find that a Starrett Ice Merchandiser ties in most effectively with their ice maker —providing for the first time both facilities for making the ice as well as storage in packaged ready-to-sell form on the premises. A 1/4 horsepower Tecumseh compressor holds temperature at about 25°F. The Starrett Ice Merchandiser includes "Ice" lettering and a five year compressor warranty.

For further details write Starrett Refrigeration Company; 4518 West Ohio Avenue; Tampa 3, Florida.

Four Oil Tankers To Be Air Conditioned

»» THE possibility that a substantial number of in-service tankers and freighters will be air conditioned to attract "better crews" was seen in a recent announcement by Hi-Press Air Conditioning of America that it has received contracts for its systems for four existing tankers of the Mobil Tankers Company, S. A., a subsidiary of Socony Mobil Oil Company.

The four vessels are the S. S. Winamac and S. S. Wenatchi, jumboized tankers of 19,250-dwt each, originally constructed in 1939; the S. S. Waneta, a 29,250-dwt vessel, delivered in 1952; and the S. S. Wapello, a 30,000-dwt craft, completed in 1953.

S. W. Brown, president of Hi-Press, said the new contract has "special significance because it points the way to the possible air conditioning of several hundred in-service vessels by use of the unique, space-saving, high-velocity, small-diameter pipe system."

He explained that air conditioning of in-service vessels heretofore has been on a relatively minor scale because of the costs involved and the special problems posed in attempting to install conventional low-pressure ductwork systems. The latter, he said, require considerable space, and on some ships this would mean the lowering of deck heights to undesirable, and, in some cases, non-permissible levels.

"The Hi-Press system overcomes these obstacles because it requires only a fraction of the space needed by ductwork, and often can be routed alongside present utility service lines. Furthermore, the system can be erected with significant savings in manhours, and poses fewer operational and maintenance problems. It is particularly suited for tankers because of its fire-safety features. Once the system is shut down, flames cannot travel through the small-diameter piping, as it often does through ductwork, and even smoke damage is greatly minimized."

The Mobil tankers contract calls for separate installations for the midships house and the aft house. Areas to be air conditioned in the midships house include the captain's office and stateroom, pilot's room, radio room, officer's lounge, and all cadet and deck officers' staterooms. In the aft house, the chief engineer's office and stateroom, steward's room, officers' saloon, crew mess rooms, and all engineering officers' staterooms will be air conditioned.

The air conditioning systems on these ships will be capable of maintaining 84°F and 50% rh inside when the outside air temperature is 95°F, and 75°F when the outside air temperature is 0°F.

Equipment for each tanker will include: two central station units—nominal rating 3,000 CFM; air distribution piping; terminal mixing units; supply air outlets; compressors; condensers; receivers; refrigeration piping and accessory equipment; motors; motor controllers; manual room air mixing controllers; and central station temperature controls.

Matthew M. Gouger Elected Executive Vice President And Director Of Frick Company

»» THE election of Matthew M. Gouger as executive vice president and member of the board of directors of the Frick Company has been announced by J. M. Seabrook, chairman of the board. The Frick Company is a 107-year-old manufacturer of quality refrigeration, air conditioning, farm, and sawmill equipment.

M. M. Gouger

Mr. Gouger, a vice president of General Aniline and Film Corp., New York City, was formerly president of DataGraphic Systems Inc., Santa Monica, California.

Mr. Gouger was previously associated with the Glenn L. Martin Company, Baltimore where he was vice president and a member of the board of directors. Earlier, he had held executive posts with Trans-World Airlines, the Pittsburgh Plate Glass Company, and the United States Steel Corporation.

A vice president and a member of the executive committee of the American Management Association, Mr. Gouger is also an active member of the Commerce & Industry Association of New York, and the National Association of Manufacturers.

A native Texan, Mr. Gouger is a graduate of the University of Texas. He presently resides in Manhasset, N. Y., and plans to make his residence in Waynesboro in the near future.

Economical Holding -8° F Over Wide Load Range In New Report

»» A FULL description of how fluctuating freezer temperatures, caused by variations in product-load, ambient outside temperatures, or heavy traffic, are held to plus or minus 1° F automatically in a new warehouse is being offered in the form of a technical report from Freezing Equipment Sales, Inc., York, Pa.

The report explains how the refrigeration problem at Central Warehouse Corp.'s new Fuller Road warehouse in Albany, N. Y., was solved by a system of two rotary and two reciprocating compressors which automatically step down capacity from full-load—four machines on, to no-load—four machines off, through capacity reduction and partial shut-off.

Both a photograph and the drawing of a rotary compressor are used to illustrate the report.

For copies of the report, "Economically Holds —8°F over Wide Load Range," write to Freezing Equipment Sales, Inc., York, Pa.

Armour Announces Ammonia Distributors

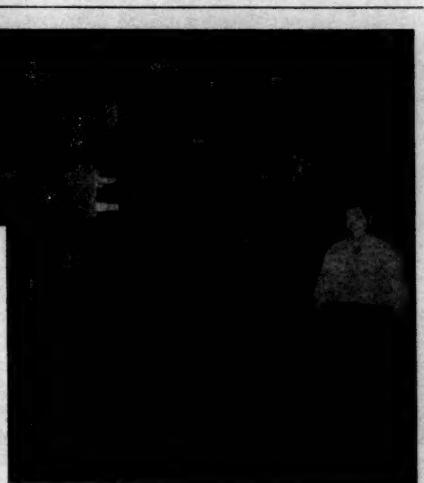
»» TWO new anhydrous ammonia distributorships are announced by Armour Industrial Chemical Company.

McKesson & Robbins, Inc., Pittsburgh, Pa., has been appointed exclusive distributor for cylinder ammonia in the western portion of Pennsylvania and the northern section of West Virginia. The distributor will also assume sales responsibility for bulk ammonia delivered by Armour tank trucks in that area.

Thompson-Hayward Chemical Company, Shreveport, La., has been named exclusive distributor in the Shreveport and nearby area to handle sales of Armour ammonia in both cylinder and bulk tank truck quantities. An extensive stock of all size cylinders will be maintained at Thompson-Hayward's Shreveport warehouse.

The new appointments bring the number of Armour ammonia distribution points throughout the nation to 183.

THE ULTIMATE IN THE COMPRESSION REFRIGERATION CYCLE*



THIS IS ANOTHER CYCLE CENTER, factory assembled and on its way to a 150 ton poultry freezing plant.

What will it do?*

It will provide liquid overfeed to the evaporators, catch the excess liquid and recirculate it to the evaporators, with these results:

- FULL COMPRESSOR PROTECTION AGAINST SLUGS
- PEAK COIL AND COMPRESSOR EFFICIENCIES
- SUB COOLED LIQUID FEED AT CONSTANT PRESSURE THE YEAR AROUND
- PRACTICALLY UNLIMITED RATE OF LIQUID FEED AT ABSOLUTELY NO POWER COST
- NO MECHANICAL PUMPS
- NO FLASH GAS IN LIQUID LINES
- SAFE, AUTOMATIC PLANT OPERATION
- OIL SEPARATION, ANY REFRIGERANT
- HIGHER SUCTION PRESSURES
- LARGE POWER SAVINGS
- LARGE SAVINGS IN FIRST COST ON NEW PLANTS. FOR EXAMPLE, THE RECEIVER IS NOT REQUIRED AND SURGE DRUMS ARE ELIMINATED.
- AUTOMATIC HOT GAS DEFROSTING AT MINIMUM COST

ASK FOR BULLETIN CC-2

* NOT JUST A LIQUID RETURN UNIT. Available for any refrigerant, in capacities from 10 to 1,000 tons and more. Factory assembly is optional.

J. E. Watkins Co.
307 LAKE STREET MAYWOOD ILLINOIS

Dr. Lineweaver Named Director Of IAPI

››› DR. Hans Lineweaver, chief of the Poultry Laboratory at the U. S. Department of Agriculture, Western Utilization Research and Development Division, Albany, California, has been named to serve as director of the Institute of American Poultry Industries' Research Council. He succeeds Dr. Carl H. Koonz of Swift & Company, Chicago.

The announcement of Dr. Lineweaver's appointment by Oscar A. Day, chairman of the board of IAPI, was made at the meeting of the council last month at Albany.

In a letter read to the council, IAPI president Harold M. Williams extended the Institute's thanks to Dr. Koonz "for his whole-hearted cooperation, constructive and stimulating leadership."

"During his tenure," said Williams, "many accomplishments have been effected. The council has been reorganized and enlarged. Analytical methods for color procedure for egg products have been completed. Salmonellae testing methods have been compiled. Recommendations to the Poultry Advisory Committee have been very widely accepted. An effective working relationship between research scientists, government and industry has been accomplished. The status and stature of the Research Council have been greatly enhanced with the leadership of Dr. Koonz."

The new director of the council received his M.A. degree from George Washington University and a Ph.D. from John Hopkins University. At the USDA Albany Laboratory, he is in charge of research on the processing and utilization of poultry and eggs.

A member of the American Chemical Society, The Society of Biological Chemists, Poultry Science Association, World's Poultry Science Association, American Association for the Advancement of Science, Phi Tau Sigma, and the Honorary Society for Food Science, Dr. Lineweaver received the 1957 Research Achievement Award from Poultry & Egg National Board and he has received three USDA Group Superior Service Awards: (1) egg proteins, (2) egg solids, (3) pectic enzymes.

The Institute research council, composed of 75 men and women from industry, government and education, encourages poultry and egg research that will help improve industry's competitive position through the production of products that are a greater service to consumers; gives technical advice to industry; aids in outlining projects with research institutions; keeps the poultry and egg industry current on research development and suggests practical applications of the research; recommends timely research projects to USDA and initiates short term cooperative projects within industry to solve specific problems.

Carrier Has Air Flow Control For Multi-Story Air Conditioning Room Units

››› A NEW product developed by Carrier Corporation will cut as much as 30 per cent from the cost of room units for high-velocity multi-story building air conditioning systems, according to the company.

Hermann C. Hoffmann, general sales manager, Machinery and Systems Division, predicted the new equipment would have a more profound effect on the big-building air conditioning market than Carrier's introduction in 1956 of the modular cabinet units which have become standard for such systems.

The key to the economy of the new Bypass Weathermaster units is a factory-installed and factory-balanced control powered by the conditioned air itself. This control proportions the air flow through the cooling-heating coil while the water flow remains constant. Previous room terminal units required purchase of separate water flow controls, plus the added costs of pneumatic piping, design time and labor for their installation. The new line also permits separate water flow controls, if desired.

The Carrier executive noted that use of the built-in control also has the advantage of placing responsibility for performance of the terminal unit on one manufacturer instead of two, and he added, "a year of field testing has shown that one of the new controls can serve up to three units in certain installations."

In addition to the bypass control, the new Weathermaster's discharge grille sections are locked in place to prevent tampering. A redesigned cooling coil arrangement permits easier cleaning from the front of the unit.

Virtually any requirements can be met with one of six new models for installation under windows, beneath ceilings or in low window stools. A double coil unit provides extra high sensible cooling and heating capacity.

Further flexibility is offered through a choice of five different nozzle arrangements, matching the variations in load and ventilation requirements of all-glass structures, existing office buildings with moderate glass areas, and hotels, apartments and hospitals with low sensible heat loads and high ventilation requirements.

Creamery Package Joins With St. Regis Paper

››› ST. REGIS Paper Co. has declared its offer of exchange previously made to the holders of the outstanding stock of The Creamery Package Mfg. Co., Chicago, in effect.

Officials of Creamery Package pointed out that the equipment, products and services of the company, and its many years of experience in the dairy and food processing industries, will be significantly augmented by the vast resources of St. Regis, one of the world's largest wholly integrated pulp and paper companies, and a major producer of packaging materials and equipment.

Creamery package, headquartered in Chicago, operates plants at Arlington Heights and DeKalb, Ill., and Fort Atkinson and Lake Mills, Wis., plus 23 branches and a Canadian subsidiary. It will continue operations under the present management that has been responsible for its development and success. General and export offices of the company will continue in Chicago.

The company has gained its reputation in the manufacture of food processing, packaging, refrigerating and materials handling equipment in the dairy and related food industries.

St. Regis is a manufacturer of kraft pulp, paper and board, printing and publication papers, from its own extensive timberland holdings. It also makes a wide variety of specialty papers and paper products including glassine and greaseproof papers, multiwall paper bags, corrugated containers, folding cartons, packaging equipment, lumber and plywood, and plastics.

Of particular significance to customers of Creamery Package are the facilities of the St. Regis Machine & Engineering Division, which designs and manufactures a diversity of packaging equipment.

St. Regis sales currently are at the rate of approximately $500 million annually and the company has some 25,000 employees in mills and plants at more than 70 locations throughout the world.

E. B. Lehrack, president of Creamery Package, in commenting on the new association with St. Regis, said:

"We anticipate immediate as well as long range benefits to our cus-

tomers, stockholders and employees. St. Regis and Creamery Package complement each other in many areas, and both companies will be strengthened in manufacturing facilities, diversification and distribution.

Joseph B. Elliott Elected President of York

J. B. Elliott

»» JOSEPH B. Elliott, formerly president of Schick, Inc., and Tele-Dynamics, Inc., and executive vice president for Radio Corporation of America in charge of all engineering, manufacturing and distribution of consumer products, has been named as president and general manager of the York Division of Borg-Warner Corporation effective June 1.

He succeeds Henry M. Haase who has headed York since 1956 and is now being transferred to Borg-Warner headquarters in Chicago. In addition to his divisional duties, Haase is also a vice president of Borg-Warner.

Elliott, whose responsibilities at RCA included the air conditioning, radio, television, phonograph, record and range departments, has frequently expressed his conviction that air conditioning is the next big growth industry. He recently described it as "the one major appliance industry left without a high degree of market saturation".

Commenting on his new position, Elliott said that "York's 75 years of experience in the design and manufacturing of quality products, coupled with its pioneering achievements in air conditioning, place it in an unchallenged position to be a dominent factor in the explosive growth I see ahead."

Elliott started his business career in 1923 as a salesman for Coca-Cola Bottling Company in Atlanta, Georgia, and later became sales manager in Cumberland, Md. He then served a number of years as a sales executive with Brunswick Radio Corporation in Baltimore and Boston.

In 1935 he became associated with Radio Corporation of America. Starting as a salesman in Chicago, he served successively as sales manager, general manager, and vice president. He was executive vice president in charge of all engineering, manufacturing and distribution of consumer products for RCA when he resigned in 1954 to join Schick, electric shaver manufacturer, as president.

In 1958 Elliott took over the presidency of Tele-Dynamics, a leading manufacturer of electronic equipment for commercial and defense applications. The firm has played a substantial part in this country's missile program and Elliott has been credited with welding together an outstanding team of engineering and production personnel.

Recold Units Freeze 90,000 Pounds Of Turkey Per Day

»» WORD from R. E. "Dick" Kenney, Manufacturer's representative, is that Land O'Lakes Creameries at Frazee, Minnesota (Lakeland Turkey Growers Association), is now freezing 90,000 pounds of turkey per day! Ten Recold AS 3100 LT units, and one Recold evaporative condensor, Model DF 41-A, keep the 46,000 square foot freezing room at a constant −25 degrees. Growers Association officers report that the installation is working perfectly and that their annual pace of 27,000,000 pounds of gobbler will make a real contribution to Thanksgiving, 1960, not to mention helping to satisfy the year round national appetite for the big bird!

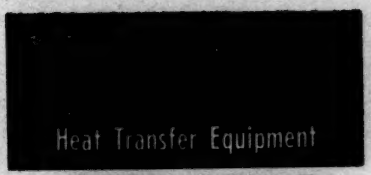
Redmond Electric Motor Catalog

»» NEW 12-page catalog describes and illustrates the complete line of fractional horsepower electric motors, blowers, replacement kits, brackets, fan blades, and accessories available from nearly 400 Redmond Distributors located throughout the United states. These items are for replacements, in-plant uses, and product applications.

Besides motors and blowers that have general use for fans, unit heaters, and air moving applications, new items are included. Among these are replacement motors for air conditioning units from 1/3 through 2 horsepower, and the new low-cost Type AO all-angle operation motor that is available from 1/20 through 1/8 horsepower. New AO blowers that deliver 800 CFM are also described. Other motors in the catalog are for light mechanical duty, such as buffers and small grinders.

Dimension diagrams, charts showing horsepower ranges, and air delivery graphs are included.

Copies of this new catalog can be obtained from Redmond Distributors Division, Redmond Company, Inc., 201 Monroe Street, Owosso, Mich.

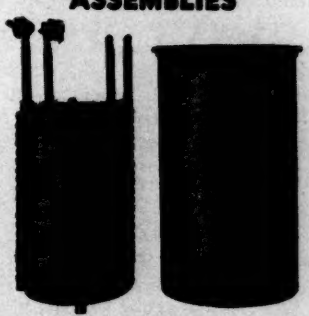


PIPE COILS
Custom Engineered to Your Requirements

HEAT RECLAIMING UNIT
Typical of the many varieties of coils produced by Rempe from any type of ferrous or non-ferrous pipe and tubing.
Coil illustrated is 15' long with 5" copper headers. Used in floor pit for reclaiming heat from waste process water to preheat boiler feed water. Ideal for reclaiming heat from any hot waste liquid and reducing fuel cost.

Tell us your problem
We'll design the coil

TANK and COIL ASSEMBLIES



For Sub-Zero or High Temperatures

One of many Rempe Coil jobs: This Tank and Coil assembly was built for use with thermostatic expansion valves to dewax oil at minus 35° F. Any diameter or any length to your specifications or our design. Can be supplied in Steel, Alloy, Stainless Steel, Copper or Aluminum.

Engineering Data Book
Pipe Coil and Fin Coil Designs. Heat Transfer Coefficients. Get a copy for your library.

REMPE COMPANY

Union Carbide Opens Technical Service Laboratory

Union Carbides new Technical Service Laboratory in Westchester, N.Y.

››› UNION Carbide Chemicals Company is now operating its new Technical Service Laboratory in Westchester (Tarrytown), New York. The new Laboratory is designed to aid in the development and improvement of the products of Carbide's customers.

This new facility centralizes and expands Carbide's customer service and use-research that, since 1925, had been carried out principally at Mellon Institute in Pittsburgh but also in several other areas including South Charleston, W. Va.; Whiting, Indiana; and affiliated company laboratories at Bound Brook, N. J.; Tonawanda, N. Y.; and Millwood, N. Y.

"An increased service effort is required to support sales of chemicals in areas undergoing rapid or significant changes," Mr. J. A. Field, Vice President—Marketing, told guests at the opening of the Laboratory today. "Customers are wary of changing their formulations, more so than several years ago, and as suppliers, we must be responsive to the needs of our customers. These needs may be defined only by offering complete test data and service backup. Our use-research programs are creative, and as such, are designed to expand and diversify the use of chemicals."

The scope of activities in this modern facility is broad and varied to provide the information needed for the company's more than 400 synthetic organic chemicals and the many end uses into which they go. Typical of the 29 major industry groups in which work is underway at the Laboratory are: automotive, petroleum, polyether foams, aerosol propellents, refrigerants, textiles, plasticizers, water-soluble chemicals, detergents and household products, gas purification, and surface coatings.

Rapidly changing technology and marketing methods mean that a chemical salesman must offer more than a good product. He must offer the technology needed to help his customers use products profitably. Specialized research and development facilities, such as the Technical Service Laboratory, are needed to supply this technology. Union Carbide's new Technical Service Laboratory extends the company's basic philosophy that its sales representatives must be oriented to customer needs. To do this, Carbide salesmen are either chemists or chemical engineers who spend many months training in technical service.

The Laboratory building accommodates about 100 scientists with a supporting and administrative staff of 50 people under the direction of Dr. A. B. Steele. The main portion is a three-story stainless steel and glass building. It is 300 feet long and 60 feet wide. About one-third of the building is devoted to administrative offices and public areas. The remainder is divided into 46 laboratories with 33 adjacent offices.

A Mechanical Test Building is connected to the main Laboratory. The test building contains a two-story test area overlooked by a mezzanine office area. Mechanical experimental activities that require large equipment are conducted in the high-ceilinged test area.

The Technical Service Laboratory and Mechanical Test Building are designed to be flexible in their experimental activities to keep pace with changing technology and customer requirements. They are equipped with the latest in analytical and evaluation equipment to investigate chemical products used in all chemical process industries.

Future Bright Says Worthington

››› "NEW products, increased sales and a bright future" were the bywords at Worthington Corporation's recent Air Conditioning and Refrigeration Division Regional Meetings.

A. J. Hackl, general manager of the A/C&R Division, pointed out that sales were up over 1959 due largely to the acceptance of Worthington's new reciprocating compressor line. He also mentioned that the increase in sales of larger packaged equipment has had a noted effect on Division results. Last year, Worthington introduced 20, 25 and 30 ton units and is expanding the line to 40, 50 and 60 ton packages in 1960.

Contest Winner

Meetings were held in Newark, N. J.; Decatur, Alabama; Chicago and Los Angeles. One of the high points of the meetings was the announcement that the Central East Zone had won the division sales contest. This contest is being run in conjunction with Worthington's overall dealer sales contest, which will result in a week's vacation in Las Vegas for winning dealers and their wives.

Allied Chemical Makes New Appointments

››› THE appointment of Marvin S. Meirowitz as field sales manager for "Genetron" refrigerants and aerosol propellants at Allied Chemical's General Chemical Division has been announced.

Mr. Meirowitz's territory will cover the New York metropolitan area. He has been with the division five years, as a "Genetron" salesman.

The appointment of Frank M. Carroll, previously superintendent, to the newly created post of plant manager at Baton Rouge Works of Allied Chemical's General Chemical Division was also announced.

"Mr. Carroll's appointment reflects expanding operations at Baton Rouge Works in the production of fluorochemicals and other products," it was stated.

With the division 21 years, Mr. Carroll was superintendent of its plants at North Claymont, Delaware, and at Newell, Pennsylvania, prior to coming to Baton Rouge in 1958. Earlier he served in several technical capacities at North Claymont.

New Ammonia Agent

Controlled Temperature Supplies of Green Bay, Wisconsin has been appointed as Agent by Allied Chemical Corporation, Nitrogen Division to handle Allied Chemical anhydrous ammonia in cylinders. Their distribution area will cover Northwest Wisconsin and the Western portion of the Michigan peninsula.

Controlled Temperature Supplies will maintain stocks at 1016 Velp Avenue in Green Bay.

Bulletin On Production Chilling Equipment

»» LARGE capacity production chilling equipment for stabilization of metals, stress relief of castings, dehydration of gases, expansion assembly, and many other production chilling applications is described and illustrated in a new bulletin offered by Cincinnati Sub Zero Products, Cincinnati.

Standard R, T, and V Model low temperature chambers are designed for accurate, economical and continuous performance in large capacity production chilling operations. The standard models are each modified to meet individual user specifications of size, type of operation, floor space, temperature range, and thermal capacity.

Temperature ranges are available to -150°F, and thermal capacities from 500 to 10,000 Btu/hr. All chambers can be modified for the addition of a large variety of accessories and special equipment. For added convenience the refrigeration systems can be adapted for connection to existing plant evaporators or other equipment. Chambers are also provided with drains for handling of convection fluids.

For a free copy of the Bulletin, or technical assistance with low temperature problems, write to Cincinnati Sub-Zero Products, 3930 Reading Road, Cincinnati 29, Ohio.

Trane Names New Market Manager

»» THE Trane Company, La Crosse, Wisconsin, recently announced the appointment of Frank A. Votava as Manager of its Market Research Department.

F. A. Votava

Before joining Trane, he was a market analyst with the Pillsbury Company, Minneapolis, Minnesota, and Crucible Steel Company of America, Inc., Pittsburgh, Pa.

Votava holds a BS degree in Chemical Engineering from The University of Wisconsin and a MS degree in Industrial Administration from Carnegie Institute of Technology.

He is a member of the American Marketing Association and Toastmasters International.

Barber-Colman Company Plans Plant Expansion

»» BARBER-COLMAN Company, Rockford, Illinois will expand plant facilities to meet increasing demands for their automatic controls, air distribution products, overhead doors, and industrial instruments. The addition to the Park Plant, situated on fifty acres at the northern edge of Rockford, will increase the present plant area by approximately 170,000 square feet.

General architects for the project are Hubbard and Hyland of Rockford. E. R. Gritschke and Associates of Chicago will design mechanical and electrical installations, including air conditioning, heating, ventilating, plumbing, lighting and wiring.

Classified Advertising

USED EQUIPMENT—wanted & for sale

FOR SALE—York 10x10 compressor, complete with 60 h.p. G.E. induction motor. Motor is 3 ph., 50/60 cycle, 1175 r.p.m., 220/440 volts with 1-3 ph across line starter. Can be seen in operation. North Pole Ice Co., Fairmont, W. Va.

FOR SALE—Frick Compressor—11½x12 compressor with "Ideal" 175 h.p. 60/220/3 motor and starter and panelboard, with brand new extra cylinder housing assembly; motor and exciter completely rebuilt November 1958 and not used since; compressor completely overhauled in 1956 and according to Frick representative. "like new". Equipment available immediate delivery at tremendous bargain. Write Box JL-4, c/o Industrial Refrigeration.

FOR SALE—York 7½x7½, 8x8, 9x9 compressors with AC motors and starters, recently reconditioned; buy one or all. Address Box JL-6, c/o Industrial Refrigeration.

WANTED—one 4 cylinder 11½x10, or comparable size, ammonia compressor, direct connected to synchronous motor. Must be in first class condition. Address Box JL-2, c/o Industrial Refrigeration.

FOR SALE
(2) 11x9 York compressors.
10x10 York V-belt drive.
9x9 & 5x5 York compressors.
(2) 60 h.p. G.E. motors 900 r.p.m. w/controls.
100 h.p. D.C. motor, 230 volts, w/controls.
JOHN F. CARSON
A & Venango Sts., Philadelphia 34, Pa.
GArfield 6-2221

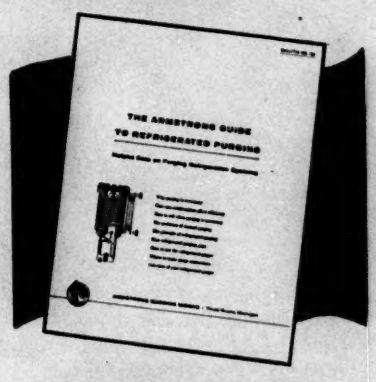
REFRIGERATION EQUIPMENT FOR SALE
Advise Us Your Needs
Use QUICKSEAL—stops brine tank leaks.
Use CLERTEMPICE—clears and tempers ice.
Born Company 80 East Jackson Boulevard.
Chicago 4, Illinois. WAbash 2-8299.

FOR SALE—One used Halstead Mitchell cooling tower, Model WT 3014, with 112 gallon make-up tank; reasonable. D. Kelton, 5746 Broadway, New York 63, N. Y.

FOR—SALE—2 Frick 10x10 refrigeration compressors, with motors, starters, etc., located in closed brewery; buy one or both, price $2200. Also 50 ton cap. evaporative condensers, shell and tube receivers, etc.; ask for listing of Worthington "Freon" compressors and evaporative condensers; no obligation. Write Box JL-7, c/o Industrial Refrigeration.

FOR SALE—AMMONIA EQUIPMENT
1— 15 ton Frick ice making plant.
1— 10"x10" 4-cyl. Frick duplex D.C. to 225 h.p. motor.
1— 9"x9" 4-cyl. York duplex D.C. to 150 h.p. motor
3— 10"x10" 2-cyl. York D.C. to 100 h.p. motor
1— 9"x9" 2-cyl. York D.C. to 75 h.p. motor
2— 10"x10" 2-cyl. York with V type flywheel.
1— 9"x9" 2-cyl. York with V type flywheel.
2— 7½"x7½" & 8½"x8½" 2-cyl. Vilters
3"x3", 4"x4", 5"x5" & 6"x6" York and Frick compressors.
3"x3", 4"x4" & 5"x5" York condensing units.
6— York floor type blower unit coolers.
1— Niagara floor type blower brine spray.
11"x22"x47" 300-lb. ice cans.
75, 100, 150-ton ice making plants.
6— shell & tube condensers, 25-ton capacity.
ENTERPRISE EQUIPMENT CORPORATION
328 Bryant Ave. Bronx 59, N. Y.
Cable "ENTREMA" Phone DAyton 8-2121

GET THIS BULLETIN!



THE ARMSTRONG GUIDE TO REFRIGERATED PURGING

Here, in a new 12-page bulletin, are answers to the most commonly asked questions about removal of air from refrigerating system, from why you should to how to do it. Ask for your copy, today.

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3604 Maple Street
Three Rivers, Michigan
The manufacturers of Armstrong Steam Traps

GENUINE

OZITE®

STANDARD *ALL-HAIR*

PIPE COVERING

INSULATION

lasts a lifetime!

Genuine Ozite pipe covering insulation installs easily on curves, fittings, straight pipes or valves . . . stops wasteful heat absorption effectively and permanently. Ozite insulation also helps maintain uniform temperature and increase your equipment's refrigerating capacity. Try Genuine Ozite!

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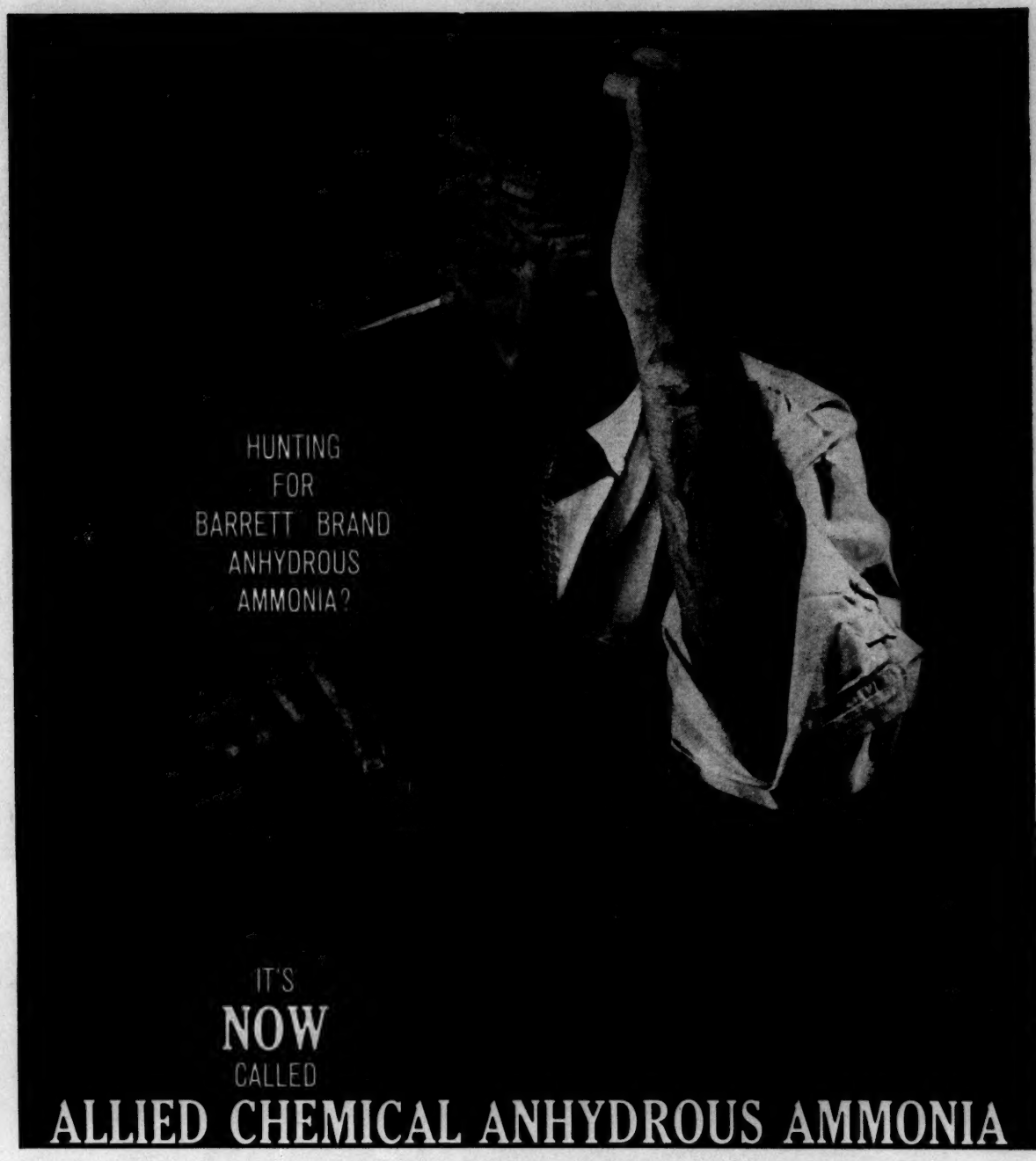
Liquid Ammonia Recirculating and Return systems

Some confusion exists among refrigeration users over popular references to "liquid recirculation" and "liquid return." This 32 page reprint from INDUSTRIAL REFRIGERATION, as well as being informative with regard to economic application in modern industrial refrigeration plants, should help clarify the use of each method and system.

Available at 50 cents per copy from

Industrial Refrigeration
433 N. Waller Ave., Chicago 44, Ill.



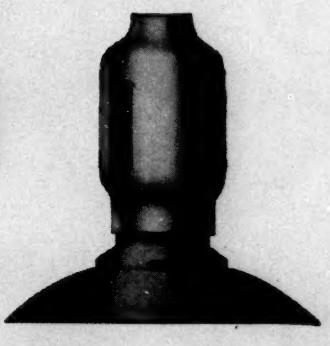
IT'S
NOW
CALLED

ALLIED CHEMICAL ANHYDROUS AMMONIA

The name "Barrett Brand" — known throughout the refrigeration industry — has been changed to ALLIED CHEMICAL ANHYDROUS AMMONIA. Otherwise, there's been no change. Same quality product, same green identifying cap on the cylinder.

Whether you use an absorption or compression system, ALLIED CHEMICAL AMMONIA is still the most economical and efficient refrigerant you can buy.

ALLIED CHEMICAL ANHYDROUS AMMONIA is supplied in 150, 100, and 50-pound cylinders with the identifying green cap. For prompt service on your orders, check the yellow pages of your phone book under "Ammonia" for your nearest ALLIED CHEMICAL ANHYDROUS AMMONIA distributor.



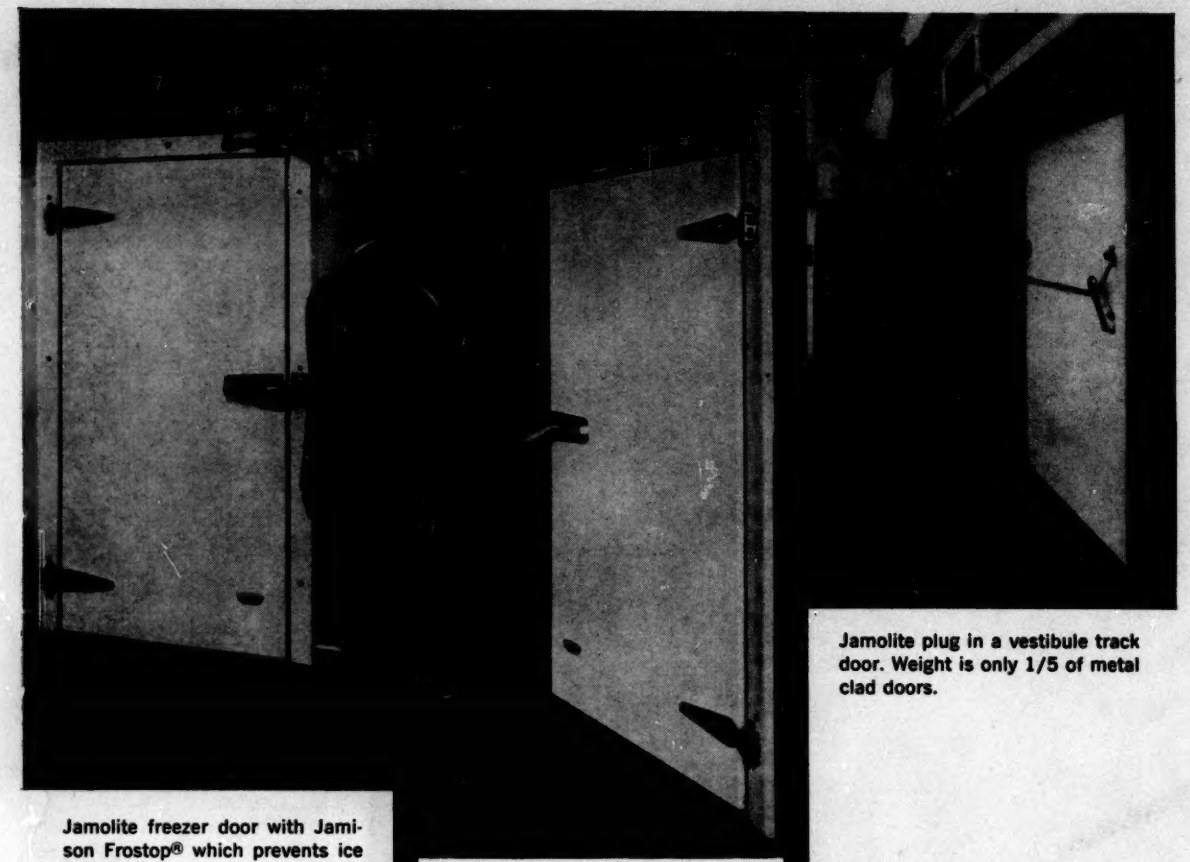
BASIC TO AMERICA'S PROGRESS

Allied Chemical

NITROGEN DIVISION
Dept. CA9-11-2, 40 Rector St., New York 6, N. Y.

2819

versatile **JAMOLITE®** saves time and costs in solving door problems at Purity Stores



Jamolite plug in a vestibule track door. Weight is only 1/5 of metal clad doors.

Jamolite freezer door with Jamison Frostop® which prevents ice formation.

Jamolite cooler door is flush fitting for better appearance, easier cleaning.

At Purity Stores, Ltd., Fresno, Calif., Jamison Jamolite plastic doors give these important advantages:

- **installation time was cut by more than 50%**
- **savings on lower first cost compared with stainless clad doors**
- **easier opening and closing**
- **improved appearance, easier cleaning**

Jamison Jamolite doors are available in white and four attractive colors. They are constructed of a rigid shell of glass fibre reinforced polyester plastic, and insulated with foamed-in-place polyurethane plastic, 4" thick. Write today for complete data on Jamolite doors to Jamison Cold Storage Door Co., Hagerstown, Md.

Insulating Contractor:
Western Asbestos Co.
Fresno, Calif.

JAMISON
COLD STORAGE DOORS